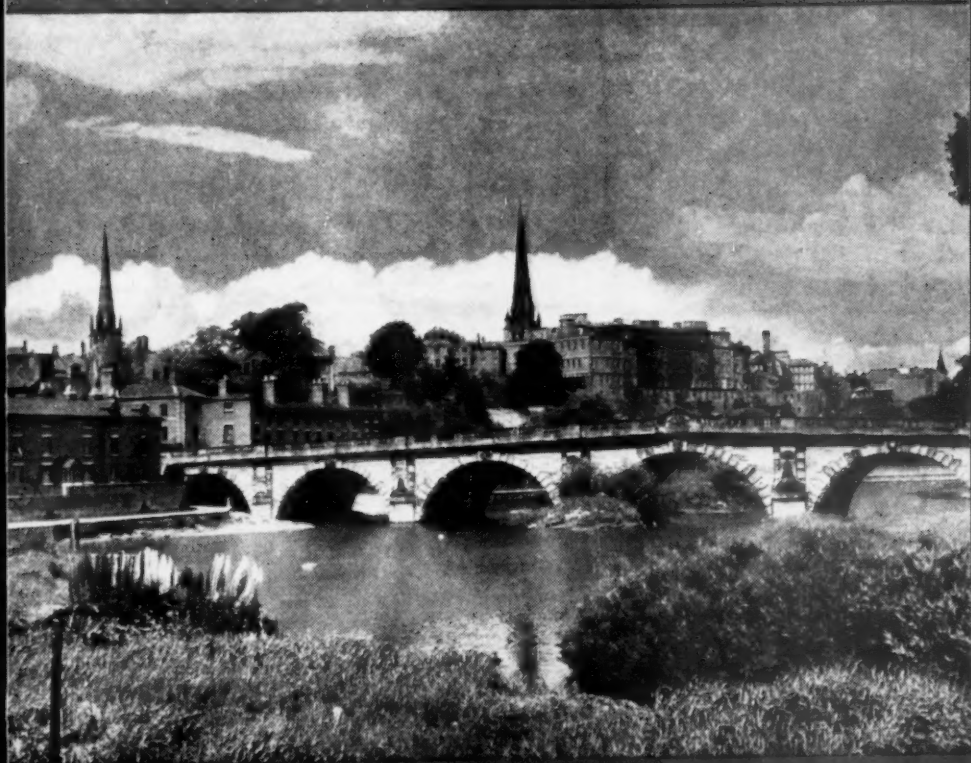


WEST MIDLAND FARMING NUMBER

July 1949

# *Agriculture*

*The Journal of the  
Ministry of Agriculture*



VOL. LVI

No. 4

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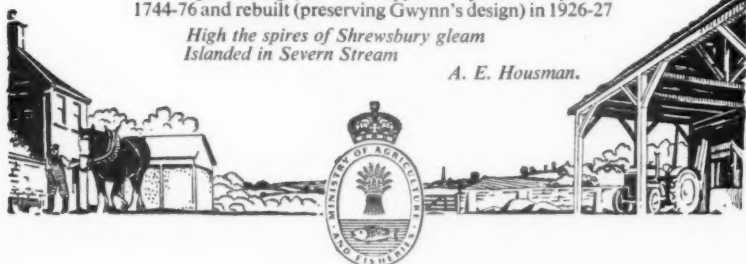
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## Cover Photograph

The English Bridge, Shrewsbury, built by John Gwynn in 1744-76 and rebuilt (preserving Gwynn's design) in 1926-27

High the spires of Shrewsbury gleam  
Islanded in Severn Stream

A. E. Housman.



SHROPSHIRE

C H E S H I R E

FLINTSHIRE

Whitchurch

Market Drayton

Wem

Ellesmere

Oswestry

SHREWSBURY

Newport

Wellington

Oakengates

Dawley

Shifnal

Much Wenlock

Church Stretton

Bishop's Castle

Clun

Craven Arms

Ludlow

STAFFORDSHIRE

Worcestershire

Herefordshire

Radnorshire

Montgomeryshire

Denbighshire

— SCALE OF MILES —

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# AGRICULTURE

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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VOL. LVI

No. 4

JULY 1949

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## THE GEOGRAPHICAL BACKGROUND TO WEST OF ENGLAND FARMING

Professor L. DUDLEY STAMP, C.B.E., D.Sc., B.A.

**F**EW countries of equal size anywhere in the world can boast the variety of scenery to be found in Britain. That scenery reflects not only the geological and physical build of the land and its soils but also very markedly the consequent use which the farmer has made of the countryside. Shrewsbury, the venue of the 1949 Royal Show, is almost unique in the scenic and farming contrasts to be found within a radius of 50 miles.

Geologists and geographers commonly make a broad twofold division of Britain into Highland Britain (the north and west) and Lowland Britain (the Midlands, south and east). For the most part Highland Britain comprises hilly country built up of the older rocks, where hills attract a heavy, often excessive, rainfall, and soils are thin, poor, and sour. In Highland Britain human settlement tends to be restricted to the valleys, and the cultivated lands are often separated by wide stretches of unenclosed moorland. The bulk of Wales and the Welsh border lands—that is, the country to the west and south-west of Shrewsbury—belongs to Highland Britain, and is of this general character.

Lowland Britain, on the other hand, not only comprises land which for the most part is less than 1,000 feet above sea level and consists of the younger geological rocks, breaking down more easily into deeper and richer soils, but also tends to have more moderate rainfall and to provide, in general, soils which the farmer can cultivate either by the plough or under grass. Lowland Britain includes the plains which actually surround Shrewsbury and stretch away to the north into Cheshire, to the north-east into Staffordshire, and south-eastwards into Worcestershire.

Looked at in more detail there is, of course, a very great variation in Lowland Britain. In places its rolling plains are interrupted by hill masses, some of which may be small and conspicuous, like the Wrekin, others larger, though lower, like the Black Country and Cannock Chase, but most of which are marked by the outcrop of older rocks, as it were in islands surrounded by younger rocks. Economic conditions on these hill masses, from the farmer's point of view, are poorer than on the lowlands proper.

If we look upon Shrewsbury as centrally placed in the county of Salop, to the north there lies Cheshire, to the south Herefordshire, whilst to the north-east there is Staffordshire and to the south-east Worcestershire. It is worth while to look briefly at the geographical background of farming in each of these counties.

## BACKGROUND TO WEST OF ENGLAND FARMING

**Shropshire** The large, roughly rectangular county of Salop, or Shropshire, can be divided into a northern and a southern half by an irregular line which runs east and west, a little to the south of Shrewsbury itself, and which terminates eastwards in the Wrekin.

NORTH SHROPSHIRE is a plain over which the retreating ice sheets of the Great Ice Age deposited their load in the form of boulder clay, with glacial sands and gravels. This drift-covered plain was once dotted with innumerable lakes occupying the hollows, but most of these lakes have since dried up, though remnants (they are usually known as "meres") still remain in places. But it is not surprising that the soils of the North Shropshire Plain are remarkably varied. There are dark, peaty soils of the old moors. There are stretches of fine loam, or silty deposits of the old glacial lakes. There are areas of fine and coarse sand, also of glacial origin—sometimes so coarse and hungry as to be of little use, except as heathland. There are large tracts, too, of boulder clay, sometimes heavy, stony, clayey, and other times lighter and more loamy in composition. Arising out of the drift-covered plain there may be occasional islands of sandstone, whilst here and there such hills as the Breiddens mark the outcrop of some resistant underlying rock.

Thus farming conditions over the North Shropshire Plain vary in detail, and the land is described in general terms as "devoted to dairying with various subsidiary enterprises".

SOUTH SHROPSHIRE, by way of contrast, is a land of hills, arranged in long ridges, such as Wenlock Edge, or isolated piles, such as Caer Caradoc, or bleak plateau, such as the Long Mynd, between which are valleys and lowlands, in places remarkably fertile.

The poorer and higher lands, of which the Long Mynd is the best example, are moorlands of little agricultural value, except for a few hill sheep, and the greater part of South Shropshire devotes its attention to rearing, though often supplemented by other enterprises, especially in the more accessible valleys. In the south-west of Shropshire, in the well-known Clun Forest area, hill sheep farming becomes the dominant occupation.

Before leaving Shropshire, we should notice that the North Shropshire Plain sends tongues westwards amongst the Welsh Hills into Montgomeryshire, whilst in the north-west of the county those same Welsh Hills overlap the border into Shropshire itself and the hill sheep lands overlook the fertile plains. To the east of Shropshire we find a larger proportion of arable land stretching into Staffordshire, where the farming can be described as essentially mixed. It is in this area that much sugar beet is grown.

**Cheshire** In general, the heart of Cheshire, the famous Cheshire Plain, is a northward continuance of the Shropshire Plain. There is the same wide variety of glacial or drift deposits, there are the same islands of sandstone or older rocks, giving rise to such poorer tracts as that occupied by Delamere forest. There are the same Welsh Hills overlooking the plain from the west, whilst on the east there are the foothills which are the outer ramparts of the Pennines. The heart of Cheshire is, of course, one of the most famous, if not *the* most famous, of the dairying areas of Lowland Britain. In most parts of the Plain the former almost exclusive reliance on permanent pasture has given place to dairying based on a more extensive use of the plough, and there are parts of the Cheshire Plain which rank high in land quality under almost any crops. This heart of the Cheshire Plain is precious land which needs to be protected in every way possible from the onslaught of those who seek, rightly enough, to find sites for new towns or industrial expansion. In this regard Cheshire is in a vulnerable position, because of the need to find new accommodation for the "overspill" populations of Liver-

## BACKGROUND TO WEST OF ENGLAND FARMING

pool, Birkenhead, Manchester and the Pottery towns. Unfortunately the well-drained, gently rolling land, so productive of much-needed food, is also the most attractive to the industrialist and town planner.

**Herefordshire** Lying to the south of Shropshire is one of the most remarkable counties in England—Herefordshire. The county town, Hereford, lies approximately in the centre of a broad, open basin of rich, red soils, derived from the Old Red Sandstone and marls. There are, of course, islands of older rock rising from the surface, but the Herefordshire basin gives place on all sides to rolling hills: to the Black Mountains in the south-west, the hills on the Radnorshire border in the north-west, whilst Herefordshire is cut off from its neighbour, Worcestershire, on the east by that thin but conspicuous line, the Malvern Hills and their continuation northwards. On the *Types of Farming Map*, prepared by the Ministry of Agriculture and Fisheries, the Herefordshire Plain, or basin, is described as "mixed farming, with a substantial rearing or feeding side". It is the home of the Herefords and still their great stronghold. It is a country where hop gardens and orchards bear witness both to soil quality and to a relatively low rainfall. Only on the hilly margins does rearing take the place of mixed farming.

**Worcestershire** In many ways Worcestershire is the most favoured of the Midland counties of England from the farmer's point of view. Its varied soils, many of glacial origin, are on the whole highly fertile. There are certain river terraces which are outstanding in this respect. But Worcestershire also has the climatic advantage of a rainfall as low as that in eastern England, combined with a relatively early spring and, in many tracts, an absence of frost pockets. Not unnaturally, farming interest centres on the Vale of Evesham, with its intensive market gardening and fruit production. The market gardens, whether of the big man or of the small holders, have extended beyond the fertile terraces of the Avon to hill slopes and poorer land beyond, but this is a region unique in the country.

Much of the remainder of the county has red soils of glacial origin, but in each the bulk of the material is derived from the underlying Keuper marls and sandstones, soil light enough to be easily worked, but heavy enough to be retentive of moisture. This is country now devoted mainly to dairying, with the enormous consuming markets of Birmingham and the Black Country just to the north. Rather lighter soils, which are predominant in the western part of the county, have more extensive areas under the plough, but again dairying must be described as the dominant farming enterprise.

**Staffordshire** Apart from the infertile upland of Cannock Chase, stretching southwards into the old Black Country, and the industrialized area of the North Staffordshire coalfield, the large county of Staffordshire falls broadly into two parts. The north-eastern sector belongs strictly to the Pennines. There are gritstone areas and some limestone areas adjoining those of Derbyshire, and this is country where, whatever may have been the farming enterprise in the past, the focus is now on dairying. Much of the land is unsuitable for ploughing and the emphasis in pre-war years was on grassland management.

The south and west of Staffordshire belong to the same general belt as we have already mentioned in north-western Worcestershire and in eastern Shropshire—low, rolling country of varied soils, which the Ministry's map shows as "mixed farming with a substantial dairying side".

## BACKGROUND TO WEST OF ENGLAND FARMING

**Summary** To try and summarize what we have already said, Shrewsbury lies in the centre of country where farming of the most varied types is carried out, but we notice wherever the matter is studied how very markedly the type of farming is dependent upon the geology and soils and the relief of the land. We find every stage from what can be ranked as the most fertile and most productive land in the world to bleak, barren hill moorland, virtually uninhabited by both man and beast. The really fertile areas of first-class land are restricted and are of the utmost value in the national economy.

## ADVISORY WORK IN THE WEST MIDLANDS

W. B. MERCER, M.B.E., B.Sc., N.D.A.

*Provincial Director, West Midland Province*

**T**IME was when every district had its appropriate form of farming. Geography, soil, climate and the forces of history combined to induce systems of land management exactly attuned to circumstances; every area had its own particular problems which it solved in its own particular way; the law was as neat and tidy as Adam Smith's political philosophy. Or so it seems as one looks back over the war-scarred years.

As usual memory plays us false. Farm life never was as simple as it seems in retrospect. It did not really divide into watertight compartments. In this part of the country it was convenient to regard practice as falling in one or other of five systems—the dairying regime of Stafford and Cheshire; the arable and beef of Central Shropshire; the upland rearing of Hereford; the summer grazing on the clays of Warwick, and the fruit-vegetable-dairy complex of the small farms of Worcester. But this was a broad generalization never wholly true, for dairying always interlocked with feeding; there was a first-class arable tradition in parts of Hereford, and early potatoes were a key crop in North Cheshire. What distinguishes the farming of today from that of pre-war days is the fact that all systems have been subjected to a common strain and all bear the marks of that strain.

**War-time Changes** With the war came mechanical devices of power, speed and weight hitherto undreamed of; it presented all stockmen alike with the problem of self-sufficiency, and it rendered clamant a solution of that human problem which has vexed the countryside since the time of the Black Death—the share of the labourer in the fruits of his toil. Gradually these forces began to dominate those of nature and of economic history. Everywhere the problem of maintaining existing or customary stocks became the prime consideration. As the plough bit deeper, even upland farms began to take on an appearance reminiscent of the lowlands; ant-hills, rabbits and bush disappeared from the lias (before the war the traveller to London could always tell when he ran on to the lias by the ant-hills); the smallest farms began to depend on tractor power.

Though the introduction of the tractor tended to iron out area differences in craftsmanship, a high degree of specialization remains. In their way the arable arts of mid-Shropshire, where beet and carrot singling have been brought to perfection, are almost as striking as the celebrated manual

## ADVISORY WORK IN THE WEST MIDLANDS

cunning of the Evesham market-growers on their crowded acres. Some measure of adjustment of working hours to modern conceptions has been effected in most districts; and though the cowman still carries his seven-day burden, human ingenuity, aided by mechanical devices, has evolved methods of lessening the continuity of his toil. The slow process of rural re-housing, the even slower spread of electric current, and the recasting of wage rates, begin to show their effects in population statistics. At long last the downward droop of the agricultural workers' graph has flattened out, and now slightly risen.

It is against this background of a countryside in the throes of great physical and social changes that advisory work must be viewed. As usual under stress of adversity, technical progress has been rapid. All sorts and conditions of men have brought their influence to bear. Pioneer farmers—whether as members of Executive Committees or as private individuals—county staffs, university and college advisers, staffs of several divisions of the Ministry, have all played their part. Great research centres at Long Ashton and Drayton have illumined the area like Portia's potent candle. In this article no attempt is made to assess the respective influences of these several forces; it aims merely at drawing in broad outline the results achieved.

**Soils and Land Management** There is very little bad land in the West Midlands. Apart from the Bunter pebble beds of Cannock Chase and the bare mountain tops of Central Shropshire, scarcely anything is uncultivable. Most of the hill lands have soils of considerable depth, the outcrops of the Old Red Sandstone being particularly fruitful—a fact which has been turned to good account in reclamation work. Lime shortage is general throughout the glacial drift areas, on the New Red Sandstone and on the Millstone Grits of North Staffordshire. Phosphate deficiency has also been common on permanent grass. Soil analyses, carried out by tens of thousands annually, the lime subsidy, the development of contract work in mechanical lime spreading and the general urge for higher production, have together effected great improvements in the level of fertility of the area. It is unfortunate that seasonal effects invalidate comparisons of average crop yields. All competent observers are, however, agreed that yields in general have risen in recent years as a result of rising soil fertility. Troubles from trace elements are rare, though "teart" is occasionally encountered. A trouble in milking stock on peat lands, attributable primarily to low copper in the blood, and a trouble amongst sheep in one river valley, suggestive of cobalt deficiency, are noteworthy exceptions to the general rule.

**Cultivation** The major cultivation difficulties, apart from economics, arise from the slow-draining quality of the boulder clays and the peculiar physical consistency of the lias clays. Soil profile studies frequently prove of value in fruit- and hop-growing areas, where depth of soil and evenness of water distribution are of particular significance. Old Red soils of great fertility and apparently of great depth, for instance, frequently show a curious stratum of almost powdery dryness at 18 inches, rendering them quite unsuitable for fruit. Cultivation of the lias has evoked bold experimentation. The crawler tractor has completely changed the problem of management of these intractable clays. Under carefully timed attack with powerful tools, a third-rate grazing area has become a source of 1½- and 2-ton wheat crops, and leys on which wild white clover runs riot. If the lias all lay in big farms to which water could be brought,

## ADVISORY WORK IN THE WEST MIDLANDS

it could fairly be claimed that the problem of its management was solved. It will carry three crops of wheat in succession, then three or four years of first-class ley, but that means big expanses for the plough and big tools. Much of the *lias* is, in fact, covered with smallholdings. Where they are equipped for milk production, well and good; where they are devoted to rearing, the problem of economic management at a high level of production is still unsolved. At the other extreme, light tractors with appropriate row-crop tools have created a new technique of beet cultivation on the light soils of Bridgnorth and Newport; with these implements an even higher degree of precision has been developed than was achieved in the days of horse tools, while labour costs have been strikingly reduced. There has been a notable shift in the timing of green crop operations—a concentration of effort in the early weeks after sowing or planting. The present-day routine on the best farms involves rough treatment of the young plants, but gives a far higher degree of control of weeds than the gentle, more leisurely procedure of days gone by.

**Tillage** No problem in land management has occasioned more thought and anxiety than that of the optimum area of plough land. In the earlier war years wheat, beet, potatoes and barley were expanded greatly, much of the permanent and temporary grass was ploughed; yet the total head of cattle tended if anything to rise (admittedly sheep were to some extent sacrificed). Later the tillage area began to decline, again without measurable effect on cattle numbers. *A priori*, a good case can be established today for restoring the peak tillage area. It is, however, doubtful whether statistics of stock tell the full tale; they count heads but take no account of growth-rates and body condition. Moreover, greater weight now attaches to the economics of production; more attention is being paid to greater production from grass, with its promise of protein-sufficiency. Clearly the problem admits of no general solution, but must be worked out painfully on each farm.

**Fodder** From the outset of the crisis it was obvious that protein would be a great problem in this heavily stocked area. Beans, as a self crop or mixed with cereal, were tried extensively. Despite endless modifications of methods of cultivation, however, sure-founded knowledge has not advanced far beyond the point we started from—to wit, that beans thrive well on certain soils and fitfully or not at all on others. Linseed, again, has not yet generally yielded protein measurably greater than that obtainable from other sources. On the whole, the nearest approach to a solution has been found in liberally treated kale, in mixed corn and pulse, and above all in grass. It should, however, be said that shortage of protein as a specific ingredient of winter fodder has proved, in every hard winter since 1939, of less consequence—or at least of less demonstrable consequence—than mere fill-belly. Young stock have had to endure some grisly winters. Grass management has without doubt made great strides. The idea of intensive treatment with phosphates and nitrogen has grown fast; period leys, e.g., a ryegrass-dominated early ley and a timothy ley for later use have been accepted into farm routine; the idea of preparing leys for period grazing has gained wide acceptance.

Three features in connection with the establishment of grass call for special notice. Under a great variety of conditions, seeding without a cover crop has been found advisable. Some County Committees in the later war years directed large areas to be so treated. Most land reclaimed from bracken or derelict turf has been reseeded with a permanent mixture



## ADVISORY WORK IN THE WEST MIDLANDS

on the upturned sod. In Hereford, however, owing largely to the place which sheep occupy in the economy of that county, a system of pioneer cropping with rape and similar sheep fodder has been evolved, the permanent or long ley mixtures being sown a year or two after the initial breaking up. Though experimental evidence is lacking, the belief in sheep as builders of the fertility required for establishment of a sward is very strong throughout this area, and in these days of meat shortage there is much to commend it.

**Grass Conservation** After a false start in the middle years of the war, grass preservation in the form of silage has grown rapidly: on some large dairy farms grass ensilage has now entirely replaced haymaking, and analysis of silage samples has become a task rivalling in magnitude that of soil analyses.

As a special feature of grassland husbandry, development of a considerable industry in herbage seed production is to be recorded; and the design of methods of management to provide maximum fodder consistent with maximum seed yield constitutes one of the most intriguing of recent problems.

By and large, diseases and pests of crops have remained sporadic, despite very risky crop successions in some areas. Potatoes, the bugbear of Hereford, have been willingly—indeed over-willingly—grown in parts of Staffordshire to the extent of 30 or 40 per cent of the tillage area, to the great satisfaction of the potato eelworm. In certain years, Take-all and Eyespot have wrought widespread damage in wheat fields; while the ubiquitous wireworm was a sore trial in the early years of the ploughing-out campaign. But, all told, these afflictions have not greatly lowered output. Of more general interest is the problem of holding stocks of material and machinery for distribution of pest deterrents—a problem but partially solved by the development of contract spraying work.

**Livestock** In animal husbandry the dairy cow has had pride of place.

It is tempting to see, in the statistics of production, a reflection of the Ministry's campaign for better breeding methods. Output per cow, which fell sharply on the outbreak of war, has since risen steeply. The following figures of milk sales from Cheshire are typical of the area:

1938/39	1941/42	1944/45	1948/49
73.7	66.8	73.6	84.4

Clearly better breeding could not alone have had this effect, though it is probably now the major factor. There has been a considerable swing from dual-purpose to pure dairy breeds, and the first fruits of A.I. are being gathered. But the initial recovery must be ascribed to improved feeding and management—factors which continue to play an important part. Considering the magnitude of the industry, both recording and the drive for tubercle-free herds have made good progress. The introduction of the National Milk Testing and Advisory Scheme brought to this area an immense task; in the nature of things a task in which success can be measured but roughly—and that only over a period of years. That the scheme has broadly achieved its purpose scarcely allows of doubt; but there must be many amongst the labourers in this field who reflect sadly that while man's work runs from sun to sun, a woman's work is never done.

Much less satisfactory is the record of quantitative composition of milk. The slow fall in the percentage of fat and of other solids in milk, noted in other parts of the country, has here become a matter of major

## ADVISORY WORK IN THE WEST MIDLANDS

concern, for the proportion of deliveries falling below the presumptive standards in the spring of each year is very disconcerting, and unfortunately short-term remedies have up to now proved mere palliatives.

**Total Output** Measurement of agricultural output is notoriously difficult owing to the variety of products involved, the extent of inter-farm trading, the importation of the products of other lands, and so on. At least a rough idea of trends can, however, be gathered from the returns of acreages and stock numbers, if appropriate standard monetary values are given to each. Excluding pigs and poultry (whose produce derives mainly from overseas), the aggregate annual output of the six counties\* in 1939 and 1948 respectively can be expressed as follows:

Index Value of Output			
	1939	1948	
<i>Cattle</i>			
Herd increase ..	—	0.2	
Young stock ..	27.1	30.0	
Milk and cheese ..	52.0	54.7	
<i>Sheep</i>			
Breeding flock decrease	—	0.4	
Lambs and young stock	6.2	3.6	
Wool .. .. .	0.8	0.5	
<i>Crops</i>			
Wheat and barley ..	5.9	13.6	
Potatoes .. ..	6.6	14.7	
Fruit .. .. .	6.6	7.0	
Vegetables .. ..	4.9	9.9	
Hops .. .. .	3.3	3.4	
	<hr/> 113.4	<hr/> 137.2	
Deduct for Feedingstuffs	13.4	5.6	
	<hr/> 100.0	<hr/> 131.6	

### LOOK OUT FOR COLORADO BEETLE

The utmost vigilance is necessary during the coming months to prevent the Colorado beetle establishing itself in this country. This pest of potato crops is still prevalent over large areas of Europe, and although fewer colonies of beetles were found on our potato crops last year than in 1947, a number of beetles reached this country with imported produce or were intercepted on ships. The danger of infestation from this source is as great as ever and a few discoveries of single imported beetles have, in fact, already been reported this year. The success of measures for the eradication of the pest depends on prompt action, and the Ministry of Agriculture appeals to everyone to report any discovery of the pest immediately.

The Ministry's Advisory Leaflet No. 71 gives a full description. Any yellowish beetle about half an inch long with black stripes—running up and down the beetle, not across—or any red or reddish yellow grub found on potato leaves or among vegetables should be regarded as suspect, and specimens sent, preferably with a piece of potato leaf, in a tin box with no holes to the Ministry of Agriculture, Plant Pathology Laboratory, Milton Road, Harpenden, Herts., with a letter stating the exact place where found and the name and address of the finder. Nothing more should be done until instructions are received from the Ministry.

\* Cheshire, Herefordshire, Shropshire, Staffordshire, Warwickshire, Worcestershire.

## GRASSLAND DEVELOPMENTS IN THE WEST MIDLANDS

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THE pastures of certain parts of the Midlands have a world-wide reputation for their excellence. The renowned pastures of the Market Harborough district of Leicester and Northampton, for example, are some 70 miles from Shrewsbury, while the almost equally famous dairy pastures of the Cheshire Vale lie some 20 miles to the north of this year's Royal show-ground. Within the province we have other districts of grassland and livestock fame, such as the home of Hereford cattle, Clun, Kerry and Shropshire sheep, while over the Welsh border we find fine herds of Welsh Black cattle and Welsh mountain sheep grazing on the rough moorlands and marginal lands of the Principality and the border country. Taking the grasslands of the area as a whole, a critical examination shows that the area is dominated by *poor permanent grass* ranging from the heather, *Nardus* and *Molinia* moorlands of the hilly districts to the *Agrostis* pastures of the marginal lands and lowlands. The proportion of first quality permanent grass is low, but the whole district is well served by its equable climate and a well-distributed rainfall. The productivity of these grasslands is therefore appreciably higher than would appear from their botanical make-up.

The problem of increased production from grassland in the area is much the same as elsewhere in Britain. Most of the present permanent grasslands will ultimately have to be brought under the influence of the plough and replaced by high quality leys. Well over half the total agricultural land (excluding moorlands) in the province is still under permanent grass, largely of poor quality but with a very high potential output if farmed on a ley system. At present the proportion of leys to permanent grass is of the order of 1:3, and at the very least this position needs to be reversed so that leys shall dominate the landscape. That is one way towards higher production.

A further problem is to improve the quality of existing leys. There are far too many ill-conceived and ill-farmed leys everywhere. The ley, as all other crops, needs to be well farmed if it is to be at a high level of production. Where such a level is attained the ley will produce more animal feedingstuff than any other crop on the farm. This lesson needs to be driven home throughout British agriculture, and nowhere more so than in the West Midlands Province, where on the whole we have an almost ideal grassland climate. If our livestock industry is to develop properly, then we must farm our grasslands at the highest possible level, for it is to them that we must look to provide most of the food required by our livestock, whether in summer or in winter.

### Early Work of the Grassland Improvement Station

There is much good farming in the province; the soils vary from the very light sands of the Bunter to the obdurate clays of the Keuper and lias formations. The Grassland Improvement Station, at Drayton, three miles west of Stratford-on-Avon, occupies some 300 acres of heavy clay characteristic of the Midland and Eastern clays.

The Station started its work in 1940. Its first job was the reclaiming of land which during the 1920-40 period had become derelict, much as had scores of thousands of acres of other clay lands throughout Britain. The Drayton lands had once been well farmed in the nineteenth century arable tradition, but had gone out of cultivation in the agricultural depression which followed the disastrous harvests of 1876-79. The farm was unoccupied until 1915, when it was reclaimed under the food production drive of the first

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World War. Again it became derelict, so that by 1940 the fields were either in extremely poor grass or in thorn and bushes. A few fields were still arable, but the crops were poor and showed all the results of bad husbandry. The years 1940-44 were employed in growing cereals and other farm crops, and at the same time conducting simple experiments designed to test the establishment and maintenance of differently constituted leys. Before 1940 there was extremely little experience available about methods of regrassing the clays. It was to this task that the energies of the Station were directed on an ever-increasing scale. By the harvest of 1944 the general principles of ley establishment on the heavy soils had largely been solved and we could then say with this knowledge at his disposal that the clayland farmer need have no more failures than farmers on other and less obdurate soils.

During the period up to 1944 the increase in productivity of Drayton grasslands was very great. The 1944 leys were many times more productive than the derelict wastes of 1940. These new leys were shown to be capable of fattening both Hereford steers and sheep to prime condition. A Clun flock was kept, and good lambing results were obtained. This was on land that between the wars was reckoned to be well-nigh useless for feeding livestock. Its reputation locally was bad; the name of "Drayton Bushes" still survives. Although no longer applicable, the name was apt enough up to 1940.

The year 1945 saw the beginnings of a change in Station policy. Our terms of reference then gave emphasis to long-term experiments and fundamental research into grassland problems. There was doubt in some minds whether these heavy clays would lend themselves to detailed research and experiment. Any real difficulties have, however, been overcome and the Station is now on a full research basis. The problems of grassland improvement are of supreme importance in the drive for increased food production. Grassland is the basis of our livestock industry, and at all points the call is to step up yields and increase carrying capacity. A proper appreciation of how to grow good grass is fundamental to all this. While its work can be subdivided into several parts, the Station as a whole is concentrating on the all-important problem of extending the grazing season over as many months of the year as possible. This problem is at the very heart of the farming industry. Every week during which the farmer can allow his livestock to support themselves out-of-doors on an abundance of nutritious herbage contributes to the cheapening of production costs. Extending the grazing season cuts down labour and muck carting. Stock do better out-of-doors and are generally healthier as long as they have full stomachs.

**The Summer Gap** The Station is initially concerned, therefore, with new techniques designed to produce more grass at all seasons of the year, but equally it concerns itself with problems connected with utilization of the grass when grown. Characteristically, grass production is a seasonal affair. As with every other crop, its productivity is strongly influenced by climate, especially temperature and rainfall. The normal curve of grass production shows a large peak in spring and early summer with a secondary, but quite definite, peak in late August and September. There is a period of low production in July-August and a cessation of growth from the autumn to early spring. One problem which faces the agronomist is to investigate means of smoothing out some of the major inequalities in the rate of growth of the grass-legume crop. Much can be done by using special-purpose seeds mixtures, appropriately managed and fertilized so as to provide for the low production periods. The summer gap is fairly easily filled by such mixtures as those based on cocksfoot with lucerne, or in some districts cocksfoot with the clovers. Again the mixture based on leafy timothy,

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meadow fescue, cocksfoot and white clover can be made productive right through a normal dry summer. Type mixtures are as follows :

(A) MIXED GRASSES WITH CLOVER				lb. per acre
Timothy S.48	..	..	..	5
Meadow fescue S.215	..	..	..	5
Cocksfoot S.37	..	..	..	5
White clover S.100	..	..	..	2
Total :				17
(B) LUCERNE MIXTURE				lb. per acre
Lucerne (Provence or Grimm)	..	..	..	15
*Cocksfoot S.37	..	..	..	3
White clover S.100	..	..	..	$\frac{1}{2}$
Total :				18 $\frac{1}{2}$

Another very good way of filling the summer gap is to plant new seeds in spring without using a cover crop—that is, to sow the seeds mixture on clean land and to graze the new sward as soon as keep is available and to go on grazing on the “off-and-on” system right through the summer months. Apart from the excellence of July–August grazing made available in this way, the method of direct sowing is one of the best means of ensuring first-class establishment in all manner of weather conditions and throughout the length and breadth of Great Britain.

**The Winter Gap** So much for the summer gap. There remains the more difficult winter gap from October to April. There will always be need to conserve the high quality herbage grown in the early summer for feeding back during the winter as hay, silage or dried grass. The winter season can, however, be shortened appreciably and the need for hand feeding thereby lessened by growing out-of-season keep. Early bite in the spring can be brought forward quite a month by the use of special leys rested over the winter and given a dressing of nitrogen in late February or March. Leys based on ryegrass will normally make earlier growth than any others, but, if specially treated, cocksfoot, meadow fescue and even timothy dominant swards can be made to provide very early keep, particularly if rested during the autumn and winter. Providing early keep in this way is obviously valuable ; but more than this can be done.

Young vigorous leys based on the leafy strains of ryegrass, cocksfoot and others will provide good growth well into November if they are well treated, which includes a September rest after a dressing of nitrogenous manure in late August. So by arranging for late as well as early bite from high-class leys, the winter foddering period is shortened to the period mid-November to March in lowland districts.

With regard to the remaining winter months, a proportion of the food requirements can still come off grass grazed *in situ*. The mixtures quoted above can help. That based on mixed grasses and white clover and containing S.48 timothy, S.215 meadow fescue (Mixture A) will remain abundantly winter-green if it is rested from early September onwards and used December–January. The lucerne ley with its companion grasses (Mixture B) will also provide good feed during this period. Lucerne leys should always

\* In districts with an annual rainfall above 28 inches, either leafy timothy or meadow fescue should be substituted for cocksfoot.

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be rested in September and October, and the lucerne allowed to die back. This usually leaves a wealth of green grass leafage which *must* be grazed back hard during the winter (December-March).

**Winter Grazing Experiments** At the Station we have found that certain grasses when grown in widely spaced drills (about 2 feet apart) will produce a mass of foliage which will retain its winter greenness, quality and palatability right through the winter period. The most useful strains for this purpose appear to be cocksfoot S.143, timothy S.48, S.50 and S.51 and meadow fescue S.215 and S.53. Other grasses are under trial, and the following show some promise—ryegrass S.23, tall fescue S.170 and meadow foxtail S.55. It is possible, too, that such grasses as winter-green types of tall oat, S.59 red fescue, *Poa pratensis* and *Poa trivialis* may be found useful for this purpose. The whole technique of growing grass in widely spaced drills (which can be intercultivated during the spring and summer) seems clearly to warrant detailed investigation.

Throughout the winters of 1947-48 and 1948-49 two-year-old Hereford-type bullocks have been kept out on grass and have done well. These bullocks have been on the usual experimental plots during the summer and autumn, but have had access to grass rows (cocksfoot S.143) from January to March, when they again returned to the summer experiments. During 1947-48 winter we carried 17 bullocks on 14 acres of cocksfoot rows from January 9 to the end of March. Hay was fed at the rate of about 10 lb. per head per day, and the bullocks more than held their own. The trial was repeated on the same acreage and with the same number of bullocks during the winter of 1948-49, but this time no hay or other fodder was fed. The bullocks again more than held their own; in fact during the first five weeks (early January to mid-February, 1949) the 17 bullocks put on over 1 lb. live weight per head per day on the average for the whole herd.

Apart from the well-being of the stock, two other points emerge: (1) the cattle, when grazing, walk and excrete *between* the rows of grass, and therefore do not spoil the herbage by treading; and (2) there is surprisingly little poaching of the land. In fact there is no real poaching even in the wettest of weather, and that on the very heavy and sticky clays with which we are dealing. This is an interesting practical point which needs to be studied in greater detail to seek the answer to the question *why* there is so little poaching. The winter grazing experiments in question have been carried out in two contrasting winters. At Drayton the winter of 1947-48 was exceptionally dry in its first half (October to early January). This was followed by an extremely wet January and February. By contrast, the early winter (October-December) of 1948-49 was very wet, while the rainfall in January-March, 1949, was below average. In neither winter did we find any undue poaching of the land between the cocksfoot drills. In both years leys in the normal closely grazed winter condition were badly poached when heavy cattle were turned out on them.

**Better Leys on Heavy Clays** The results from these and other experiments conducted at the Grassland Research Station are beginning to bear fruit and are showing the way to better and more efficient production on our heavy clays. Many farmers in the Midlands are now beginning to think in terms of new cropping rotations which are designed to reduce labour demands to the minimum, while maintaining the highest possible standard of soil fertility and crop



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yield. Traditionally, the clayland farmer working on a ley system of farming reckoned that he required one man per 40-60 acres. The tendency now is to think in terms of one man per 100-120 acres.

One leading ley farmer in the Midlands (Mr. Maurice Passmore of Wormleighton, Warwickshire), farming on heavy lias clay, does so using the four-year ley with two or three white straw crops (winter wheat and winter oats chiefly). This represents a six-seven course rotation. The traditional labour-absorbing rootbreak and the bean crop are now omitted, and in proportion as the leys are productive *throughout their whole duration*, so do the corn crops yield at high level. Following the ploughing and cultivation of his leys, Mr. Passmore finds he can grow an average of 7-8 quarters (say 32-36 cwt.) of wheat per acre. His problem is to find the right variety of wheat and oats which will not become lodged at harvest. The modern French wheats, together with S.172 winter oats, have largely solved this problem for him.

The livestock policy associated with such a rotation can be of the simplest. Mr. Passmore, being a livestock enthusiast, not only follows his own inclination but also fits in with current national demands when he rears cattle and sheep and fattens them in due time on his leys. He uses many of the leys for seed production of pedigree grasses and clovers. He has a proportion of grasses (cocksfoot and timothy especially) in widely spaced drills. He takes seed from them in summer, rests them during the autumn and grazes sheep and cattle on them in December to February. By so doing he shortens the winter, reduces labour demands, and cuts his costs of production to the minimum.

This example is quoted to show how the modern farmer is quickly taking advantage of the lesson of current research work. At one time research workers tended to frown on such tendencies as these, but early practical tests will sometimes provide valuable additional data which the investigator can use to develop his work.

## FRUIT-GROWING IN THE WEST OF ENGLAND

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**F**RUIT-GROWING in the West of England is mainly concentrated in Worcestershire and the surrounding counties of Herefordshire, Warwickshire, and Gloucestershire, but Somerset, Devon, and (to a less extent) Monmouth also account for considerable acreages of both hard and soft fruits; there have been relatively small but more recent plantings of fruit in Cheshire, and small areas, mostly of older planted orchardings, also occur in Shropshire and Staffordshire.

**Historical Aspects** Fruit production in the West probably had its early beginnings in and around Evesham, where, in A.D. 907, Benedictine monks came over from the Continent of Europe and estab-

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lished a Benedictine abbey in Evesham. The Benedictines were skilled gardeners and fruit growers, and probably the vine was introduced to local culture for the purpose of wine-making. In time, however, and no doubt as a result of experience, the grape gave way to the apple and pear, and cider and perry took the place of wine; orchards were planted in the immediate vicinity of Evesham and, later, of Pershore.

Cider and perry orchards seem to have become well established in the eighteenth century and the beverages enjoyed a wide reputation, but the orchards remained local in extent and comprised little other than vintage varieties. Even in 1870 practically no fruit was grown for sale outside the area, but by 1880 a new era in orcharding was opened, and no account of fruit-growing in the West would be complete without at least some mention of those enthusiasts who did so much to provide the foundations of modern fruit-growing practice.

The name of Thomas Andrew Knight comes at once to mind. Born in 1759 at Wormsley Grange, a few miles north-west of Hereford, and not far off the Watling Street, T. A. Knight became an experienced farmer and a great authority on fruit-growing. His writings influenced the trend of fruit tree propagation and planting not only in the West of England but over the whole country. He raised many new varieties of different fruits; cherries perhaps received most attention, and several varieties still being produced commercially perpetuate Knight's name, including Elton Heart, Knight's Early Black, and Waterloo; the last of these, introduced in 1815, is as widely planted as any cherry in this country and is also planted in Canada and the U.S.A. Knight also experimented with strawberries, and "Elton," raised in 1827, was, until the early years of the present century, a well-known standard variety in English fruit gardens.

It was in 1804 that John Wedgewood, of Betley, Staffordshire, had the idea of establishing a society for the improvement of horticulture, and the Horticultural Society (now the Royal Horticultural Society) was born of his efforts. T. A. Knight contributed numerous papers to the new Society and was its President for the twenty-seven years immediately prior to his death at Downton Castle in 1838.

The spirit of Knight lived on in others who followed him in the western counties, and of these mention must be made of William Crump, who was born at Pontesbury, Shropshire, in 1843. A man of great horticultural experience, he was gardener at Madresfield Court, near Malvern, Worcestershire, from 1883-1919. Crump devoted much time to disseminating knowledge by lectures, student classes and demonstrations of improved methods of fruit-growing—a branch of horticulture of which he was passionately fond. He died at the age of 90 after a long career replete with contributions to his beloved horticulture. The delicious, late-keeping dessert apple, William Crump (Cox's Orange  $\times$  Worcester Pearmain), perpetuates his name. Many other names could be added to the list of West Country growers who have added to the store of knowledge of fruit-growing and whose successes have had a lasting effect on the industry.

The establishment of dessert and culinary plantations arose as a natural development from the old-time cider and perry orchards of the general farm. In the West Midlands the new plantings were pioneered by Mr. James Best, of the Stocks Farm, Suckley, on the Worcestershire-Herefordshire border, who set out a commercial orchard in 1881. His example was followed by a Mr. John Riley, of Putley Court, near Ledbury, in Herefordshire, and later by Mr. Paget Norbury, of Sherridge, near Malvern, who was also the first to grow loganberries commercially in this country. The first commercial plantation of plums in this country was started in 1881 at Church Lench, near

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Evesham, with Pershore Yellow, and in later years a great industry developed around this variety.

**Famous Nurseries and Varieties** The West Country has also produced some famous nurseries which flourished during the nineteenth century and in the early years of the present century, when fruit-growing in the many private gardens of the country, both in the open and under glass, was in its heyday, and commercial production was beginning to expand.

The famous Smith's Nurseries of Worcester, established about 1800 and which once covered more than 150 acres, exported plants to all parts of the world and especially to North America. These nurseries also produced plantsmen who were sought after throughout the country because of their training in an establishment which produced an amazing range of horticultural plants, including fruit trees. The apple Worcester Pearmain, raised by a Mr. Hale, was introduced to commerce in 1874 by these famous nurseries, and, until a few years ago (at least), the original Worcester Pearmain tree was still in existence in a garden at Swan Lane, Worcester.

The King's Acre Nurseries of Hereford, established in 1785, gained a high reputation for their fruit trees and for new varieties which they introduced, notable among which was the King's Acre Pippin apple. These nurseries greatly influenced planting trends and cultural methods throughout the West of England.

The Pershore Yellow Egg plum has been planted far and wide since its discovery, in 1822 or 1827, as a chance seedling in Tyddesley Wood, near Pershore, by a certain George Croke, a gardener and the licensee of the Duck Inn, Pershore. The plum-growing industry of the Vale of Evesham owes much of its development to the merits of this variety and, although overplanted in recent years, Pershore Yellow Egg is still used in enormous quantity by the jam and canning industries.

Another seedling plum which has attained great popularity in the Pershore and Evesham areas is the Pershore Purple, or Martin's Seedling as it was originally called. It was raised by a Mr. Martin, of Drakes Broughton, about 1877, and quickly became established as a popular market variety. More recently a strain of black currant, Hilltop Baldwin, propagated at Hilltop Farm, Ledbury, has proved its value by its cropping capacity and yield of juice of high vitamin C content.

Such is briefly the outline of some of the early beginnings of an industry which now holds an important place in the economy of West Country agriculture.

### Development of Fruit-growing in the West

Many acres of grass orchards planted seventy and more years ago remain.

They are typical of the early attempts

at the field culture of apples and pears, when farmers planted standard trees mainly to produce fruit for cider and perry. In time, as cider and perry became less customary as farmhouse drinks and ceased to be part of the workers' wages in kind, the newer plantings changed to culinary, dessert, or "dual-purpose" kinds which the farmer could sell at higher prices than were obtained for cider fruit. Most of these grass orchards, however, were run as sidelines on general farms; the welfare of livestock grazing beneath the trees was often the primary concern, and the fruit trees received little attention, other than protection from grazing animals.

The planting of top fruits of dessert and culinary kinds as a special venture ushered in a new era of fruit-growing when, on some farms, fruit re-

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placed livestock as the primary consideration. For apples and pears the bush type of tree appealed to the grower because it was more manageable for most cultural and harvesting operations and came into bearing earlier than the standard tree.

Plums continued to be grown on high-stemmed trees, but the half and three-quarter standards replaced the older 6-foot trunk and are still popular today. Cherries, however, are still grown as standards in grass, and the sward is close-grazed by young cattle and sheep. In a few instances only have shorter-stemmed trees been introduced and grass kept short by mowing.

In the great market-gardening areas of the West, around Evesham and Pershore in particular, fruit-growing was developed as an adjunct to market gardening. Trees, mainly plums, were planted fairly closely in wide rows (22 yards was a popular distance), the land between being used for market-garden crops and the trees acting as shelter belts. The market-gardening areas led also in the growing of strawberries and bush fruits such as gooseberries, currants (red and black) and, to a smaller extent, raspberries. The underplanting of tree fruits with bush fruits and strawberries took the place of market-garden crops on some farms, and underplanting in this way gradually became common practice on the newer established fruit farms.

The distribution of fruit-growing in the western counties has been influenced by centres of early production (e.g., Vale of Evesham) by proximity to markets, and suitability of soil. Plantings have tended to scatter as transport has improved and suitable soils and sites not subject to spring frosts have been found in new areas.

For those interested in statistics the following Table, based on the 1944 Fruit Census of the Ministry of Agriculture and Fisheries, gives a picture of the extent of the fruit-growing industry in nine of the western counties of England. The counties are arranged in alphabetical order for convenience. The soft fruit acreages for each county are stated, but for top fruits actual tree numbers are given.

**West Country Fruit Census, 1944**

County	Soft Fruit acres	Apple Trees			Plum Trees	Cherry Trees	Pear Trees
		Dessert	Cooking	Cider			
Cheshire	205	83,400	70,500	100	14,800	700	34,700
Devon	553	167,700	278,800	918,700	67,300	6,800	19,000
Dorset	59	33,100	19,600	42,700	5,100	300	3,400
Gloucester	328	114,700	200,400	115,600	274,900	8,400	41,200
Hereford	732	181,500	191,900	351,200	162,800	18,500	25,700
Monmouth	52	26,700	32,300	35,900	11,500	1,400	7,800
Shropshire	36	19,000	29,100	29,400	35,800	3,200	5,200
Somerset	315	152,700	165,200	558,000	28,400	900	12,500
Worcester	1,893	205,700	304,900	76,500	1,249,100	63,000	126,900

Rainfall has had an important influence on planting in the West. Roughly speaking, and ignoring hill and mountain regions, the western borders of Cheshire, Shropshire and Monmouthshire are within the limit of the 35-inch rainfall. East of these borders the annual rainfall varies from 25 to 35 inches a year, increasing from east to west, with one or two areas, e.g., south Worcestershire, having less than 25 inches. To the south and south-west, in Gloucestershire and Somerset, the rainfall generally exceeds 30 inches, and in many parts of Devon it is 40 inches or more.

The newer commercial top fruit plantations have developed mostly in the lower rainfall areas, and for this reason commercial top fruit plantations are fewer in the south-western districts, although excellent fruit is grown in

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many of the lower rainfall areas of the south-west where soils are suitable. High rainfall (35-40 inches), however, does not affect soft fruits in the same way, and a large acreage, especially of black currants and strawberries, has been grown for many years in the south-west.

The soils of the western counties, as elsewhere, are very varied. The heavy clays of lower lias origin in the Evesham area support a great acreage of plums; heavy loams derived from Old Red Sandstone in west Worcestershire, Herefordshire, and sandy loams of this formation in the Ross area, are planted with a whole range of top and soft fruits; and lighter soils of New Red Sandstone origin east of Exeter and in north Worcestershire grow excellent apples.

**Present-day Conditions** Changing conditions, particularly in the last twenty years, have been met by the adoption of new methods. The mainstay of commercial top fruit and soft fruits of high quality in the western counties is now the specialist fruit farm, both small and large, or the mixed farm or holding with a special orcharding section.

The fruit for cider and perry is still produced, in the main, in the numerous small (and often very old) cider orchards on mixed farms scattered over the whole area of the West. But here, also, the trend is changing, and cider orcharding is entering upon a new phase as a result of research findings and the demand for cider of high quality. For future plantings, varieties which make good orchard trees and yield fruit of high vintage quality are being propagated and planted to meet the demands of the trade. In a few instances the traditional mixed orchard of standard trees in grass, grazed by livestock, has been replaced by plantations of shorter-stemmed, bush trees of a few specially favoured varieties, established in arable conditions, but to be grassed down in later years and managed by constant mowing in place of grazing by livestock.

The commercial fruit farm also has undergone revolutionary changes in methods of cultivation. The necessity to do more of the work by machines has led to the adoption of wider planting distances for plantation trees. Undercropping of top fruit with soft fruits and "floor" cropping with market-garden produce, with its attendant increase in hand labour and difficulties of efficient pest and disease control, have been superseded by the specialist one-crop plantation wherein management can be of the highest order and costs lowered. Increasing numbers of established apple plantations are being put down to grass, to be mown frequently throughout the growing season with the gang mower; the cuttings are left on the ground to decay and so help to build up the organic matter content of the soil and to return to it nutrients in water-soluble form.

Worcestershire produces much more top and soft fruit than any other county. Of soft fruits alone it has approximately 2,377 acres, which is almost equal to the total acreage in all the other above-mentioned eight western counties. Similarly with dessert and culinary apples, pears, plums and cherries, Worcestershire is the predominant fruit-growing county of the West.

Of the areas specially concerned with particular crops, the Teme Valley and surrounding country, the Bewdley district, and the country around Ledbury and north of Malvern are well known for their apple and cherry production; plums are grown extensively in the Vale of Evesham and around Pershore; plum and mixed fruit plantations are found around Cheltenham, and the Cheddar Valley of Somerset and the Tamar Valley on the borders of Devon and Cornwall are famed for the production of early strawberries. Damsons are grown in considerable quantity along the Worcestershire-

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Shropshire border, where they are a feature of the hedgerows on many of the hillside farms and on land which might be considered "marginal" from the fruit-growing point of view.

Cider orcharding is scattered throughout the western counties; Devon, Somerset, Hereford, Worcester and Gloucester, in order of acreage and number of trees, provide the greatest bulk of fruit. Well-defined areas of cider fruit production exist around Hereford, in the Martock area of Somerset, and in the country east of Exeter. Dorset, Monmouth, and Shropshire grow relatively small acreages, and in Cheshire cider orcharding is negligible.

Fruit-growing in the West now caters for the needs of the fresh fruit market, the jam-maker and canner, and also the cider industry. The processing of fresh apple juice has latterly added to the demand for milling apples, and some commercial fruit farms are planting vintage varieties of apple to aid the disposal of cull fruit and also to supply the needs of the modern cider and fruit juice industries.

Considerable expansion in the growing of black currants has taken place during recent years in Devon, Somerset, Gloucestershire and, to a less extent, in Monmouth. Many acres of this fruit have been planted since the war under long-term contracts with the processors.

The West Country grower has shown himself capable of growing fruit in variety and of high quality; the West of England is one of the mainstays of the fruit-producing and fruit-processing industries of this country and contributes in no small degree to the employment and well-being of the agricultural community.

## CIDER AND THE WEST COUNTRY FARMER

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FOR many centuries cider-making and the culture of cider apples have been distinctive features of West Country farming. It seems probable that the introduction of cider into this country was one of the results of the Norman invasion, for the earliest record of the beverage here seems to be 1205 A.D., when it was reported that two hundred Pearmain apples and four hogsheads of wine made from the Pearmain were paid yearly as tenure at Redham and Stokesley in Norfolk. Since estates in various parts of the West Country were granted to some of the Norman barons by William the Conqueror, it is likely that the latter planted orchards of cider apples on their farms with trees brought over from Normandy, where at that time cider was already a drink of repute. It is obvious that conditions in the western counties were particularly favourable for vintage apples, for in due course at least one orchard was established on most farms, while in no other part of the country—except, possibly, Norfolk—did cider apple-growing make any real headway.

To the end of the nineteenth century the position remained materially unchanged. Most West Country farmers still maintained their cider orchards, making from the apples cider for the farmhouse and farm labourers and selling any surplus locally and to the relatively small number of cider drinkers in other parts of the country. Nevertheless, the vast changes which took place during that century—especially in the directions of scientific



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knowledge, improved transport and the development of advertising—were creating conditions destined to alter fundamentally the position of the average farmer in relation to cider-making and of the beverage itself as an article of commerce.

The first fifty years of the present century in particular have seen cider transformed from a typical farm product of the West Country to a factory-made article more or less standardized in character and rapidly attaining world-wide distribution. Factories are springing up in all the leading apple-growing districts in England and no longer is it the cider apple proper that is used exclusively for the manufacture of the drink. A substantial industry, with an annual output of twenty million gallons or more, has been created. It has its own organized National Association and also a centre for scientific research at Long Ashton\*, aided financially by Government and County Council grants.

It is inevitable that the changed conditions have created problems associated with cider production very different in character from those of the days when cider was primarily a farm-made product. Those which concern the farmer more or less directly will be considered here, and methods by which the needs of the industry can be met will be indicated.

**The Farmer as Cider-maker** It is clear from what has already been said that the recent evolution of the industry has, broadly speaking, left the farmer as the grower of the raw material and the factories as the centres of manufacture of the product. There still remains, however, a comparatively small number of farmer cider-makers, and this group can be of undoubted benefit to the industry as a whole, provided its aim is to fill the part which is particularly suited to the relatively small producer. Growing most of the fruit used by themselves, these farmers have the opportunity, denied to the large factories, of an intimate knowledge of their raw material and how to use it to the best advantage. Thus they should be able to produce a grade of *de luxe* cider, capable of commanding the highest prices, more easily than the larger producers handling much greater tonnages of fruit, which under present conditions are necessarily of very mixed character as regards vintage quality. The equipment required for the production of cider of that class need not be very elaborate or costly, and technical advice can be obtained from the Long Ashton Research Station.

Unless high vintage quality is their objective, it is likely that sooner or later the farmer cider-makers will find themselves unable to compete in the open market with the factory-produced article and will be driven to follow the lead of most other farmers and sell their fruit to the factories. It is significant that when a farmer has taken a genuine interest in his cider-making and has kept in touch with modern improvements in methods of production, he has usually managed to sell his output without difficulty at a remunerative price, and not infrequently ends by expanding his operations to a substantial and successful business. Several well-known firms have originated in that way.

**The Farmer as Fruit-grower** As, however, in most cases the farmer's concern with the cider industry today is primarily that of a supplier of apples, it becomes more and more important that, with the industry progressing rapidly, he should provide material of the right kind for its needs.

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\* See article by Professor T. Wallace, p. 170

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At present the situation in this respect is extremely unsatisfactory, largely owing to the radical changes brought about by the growing popularity of cider as a drink among all classes throughout the country. The type of cider most in demand is altogether different from the traditional dry, rough, and very variable potent liquor favoured hitherto by the seasoned cider drinkers on the farms. The first essentials are that it must be reasonably uniform in character, pleasing to the palate—usually with some degree of sweetness—and attractive to the eye in clarity and colour. To attain these essentials the factories are working under a heavy handicap in having to use raw material of a completely mixed character and variable quality. Until more suitable fruit is available, they cannot approach the peak of vintage merit which high-grade vintage apples can yield with the aid of modern technique.

The position is fundamentally the result of the defects of the existing farm orchards. Most of them were planted long before the cider industry in its present form had developed. These old orchards, which still provide most of the cider apples used by the industry, contain innumerable varieties. Many of them are chance seedlings, either unnamed or known only by some local name; in most cases evidently they have not been considered worth further propagation. Little is known of their vintage value, and the majority of those already examined can be classed as very inferior in that respect. Of the remainder, most have a very local distribution and their selection for culture does not appear to have been made with much regard for either vintage or orchard quality.

A relatively few varieties have become more widely distributed, mainly as a result of their obvious merits. Until recent years their range did not as a rule extend far beyond the county of origin. Thus, for example, varieties such as Foxwhelp and White Norman were grown extensively in Herefordshire and on the borders of adjacent counties, Chisel Jersey and Morgan's Sweet in Somerset, and Sweet Alford and Woodbine in Devon. In only one instance—Kingston Black—was the distribution general throughout the West Country, and that was obviously due to its outstanding vintage quality.

Thus the available raw material consists principally of indifferent quality fruit, although there is a small nucleus of high-grade varieties of rather limited distribution.

**Varieties to Grow** Today the cultivation of the better county cider varieties is gradually extending. This is largely the result of the establishment of a series of trial orchards over the whole of the western counties by the Long Ashton Research Station. The trial orchards planted first (forty years ago) have now matured, and the respective County Horticultural Officers have been able to demonstrate the results to farmers of their individual counties. From one of the trial orchards in Hereford data on the cropping performance and financial returns of the respective varieties and on the costs and results of spraying over a period of sixteen years, have been recorded by Mr. C. Savidge, until recently the County Instructor. These appeared in summarized form in the *Annual Report of the Long Ashton Research Station for 1946* as the most complete record so far published on cider orchard yields and finance.

Another direct result of the widening of the distribution of some of the best varieties has been the compilation of a list of varieties which, after extensive trial, can be recommended for orchard planting, both in respect of orchard performance and vintage merit. The list, with relevant data on each variety, has been prepared by the Cider Advisory Committee of the Long Ashton Station and will be supplied on application to the Station. The selected varieties cover in their ripening periods the whole of the cider-making season.

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Concurrently with these efforts to rectify past mistakes in planting inferior varieties when new orchards and tree replacements were taken in hand, a quicker result in the production of crops of the recommended varieties is being aimed at by regrafting suitable established trees of low-grade sorts in the existing orchards with those of higher grades.

Along these lines the standard of quality of the raw material for the industry can be raised to a striking degree during the course of the coming generation, and an enhanced return from the orchards assured to the growers by heavier crops from healthier trees.

It must not be assumed, however, that the raw material problem is to be solved merely by growing high-grade varieties. What the industry needs to enable it to produce the desired types of commercial ciders with a sufficient degree of uniformity is a fruit supply comprising a limited number of varieties with the necessary tonnage of each. In addition there must be a suitable balance in the quantities of fruit of each of the main classes of cider apples, namely, the sharp, the sweet, and the bittersweet.

The pressing need of the moment is for apples of the last two classes, because cull eating apples of high acidity have to be used to offset the existing shortage of cider apples proper. It is imperative, too, that the apples should reach the factory in good condition; it is impossible to make the best cider from unsound or unevenly ripened fruit.

It seems, therefore, that some form of co-ordination between the cider-makers and the growers will be required to ensure these essentials, and crops must be timed to give a steady flow of properly ripened fruit to the factories throughout the whole of the cider-making season in order to avoid undue congestion at any period.

**New Orchards Wanted** The present time is particularly opportune to improve the fruit supply position. The acreage of farm orchards has fallen from over 110,000 in 1895 to less than 58,000 in 1945, while Ministry of Agriculture statistics show the present average crop yield to be only about  $1\frac{1}{2}$  tons per acre. This decline has caused a very serious shortage of cider apples for the industry, which has consequently been obliged to make use of a large tonnage of commercial cull apples of low vintage quality.

Thus there is an immediate need for planting new cider orchards on a very extensive scale. If the usual type of standard-tree orchard is planted, there must be a delay of at least twenty-five years before crops of material tonnage per acre are obtained. Hence experiments were started by the Long Ashton Station fourteen years ago with the object of speeding up cropping, the trees being grown in bush form instead of standards. The results have proved that with suitable varieties and under suitable conditions crops of about 5 tons per acre can be reached by the seventh year after planting—a saving of about twenty years, as compared with the standard tree method. Details of the method are given in a booklet issued by the Long Ashton Station.

For most farmers the bush method in its present form is not so well adapted as the standard orchard, being more on the lines of commercial apple culture, although differing from this in that the plot is grassed down a few years after establishment. It is worth consideration by commercial apple growers for any marginal land they may have on their farms, since they already possess the necessary equipment, such as cultivators and spraying outfit. It would also give them a better chance of selling their culls to the cider factories by enabling them to offer cider fruit for blending purposes.

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This method is already attracting the attention of a new class of grower, who wants to grow apples but lacks the necessary capital or knowledge for a venture with the more costly and difficult commercial apple culture. Thus a group of specialist cider-fruitgrowers may arise.

It is significant, too, that several of the professional cider-makers have begun already to grow cider fruit, either directly or through the agency of subsidized growers. Starting in the first instance with the Standard Tree method, some have recently turned to the Bush Plot method for quick crop returns.

There are definite signs that the post-war recognition of the alarming decline in cider apple production and the recent efforts to increase the supply have stimulated a widespread effort to remedy the position. A large number of orders for young trees, beyond the capacity of the nursery trade to meet immediately, have been placed. In addition, the regrafting of unprofitable trees is being undertaken extensively, and one firm alone reports that over 10,000 scions have been supplied by it for the season's grafting.

Thus, while the industry for the next decade or so may still have to contend with its most serious present problem—the shortage of cider fruit proper—there seems a reasonable probability that ultimately this will be overcome and that the vintage quality of the raw material will be far better as a whole than ever before. With advances also being made constantly in the technique of cider-making, and the market for the drink widening steadily, the future for the typical West Country product so closely associated with the agriculture of that area seems full of promise.

## HOP-GROWING IN THE WEST MIDLANDS

E. H. WILKINSON

*Newnham Bridge, Tenbury Wells, Worcs*

**H**EREFORDSHIRE and Worcestershire comprise the West Midland hop-growing region and can be defined more precisely as the area enclosed by a line joining Hereford, Leominster, Tenbury Wells, Worcester, Ledbury and Ross-on-Wye. The survival of hop-growing in this region can be attributed to the deep, rich soil (mainly of Old Red Sandstone), the availability of local skilled labour, and the availability of pickers from nearby South Wales and the Black Country.

It may surprise many to learn that out of 22,787 acres growing in England in 1948, 6,937 (about one-third) are located in the West Midlands—4,737 in Herefordshire, and 2,200 in Worcestershire.

### Cultivation on the Worcester System

Four main varieties are grown: namely, the Fuggle, Bramling, Early Bird, and Mathon. The Fuggle occupies about

75 per cent of the acreage and, although not of such high quality as the other three (known collectively as Goldings), is less particular as to soil type and flourishes in the heavy soils of Herefordshire. The choicer Goldings prefer lighter, well-drained soils which permit full development before ripening, and experience has shown the deep alluvial deposits of the Teme Valley to be ideal for their production.

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The pioneer work of Mr. James Nott of Tenbury Wells has encouraged the planting of certain seedling varieties raised by Professor E. S. Salmon, and Brewer's Gold, Bullion and Northern Brewer have given encouraging results.

Propagation is carried out vegetatively by "strap-cuts" taken each March from established plants. During the past two years the writer, using tested East Malling clonal strains of Early Bird, Mathon and Mosaic-free males, has attempted, by layering and softwood cuttings, to propagate true-to-type, disease-free plants which the indiscriminate propagation from commercial yards will not guarantee. The results are most promising.

The hop plant is dioecious, and to obtain full development of the cones males should be planted at the rate of 20 per acre. Recent work has classified males into Mosaic "tolerant" and "sensitive" groups, each of which has been further subdivided into early, midseason, and late-flowering types. Growers can now plant a range of males to ensure complete pollination and eliminate the risk of disease transmission to female plants.

The normal planting distance is 3 feet 3 inches in rows 8 feet 6 inches apart, with posts at 15-20 feet intervals supporting a permanent system of overhead wires 14 feet high. With the aid of a long pole, two strings (coir yarn) are extended from each plant to the overhead wires in a continuous run. One man can string  $1\frac{1}{2}$  acres per day, using approximately 12 miles of string.

This lay-out is known as the Worcester system. It requires 1,500 plants per statute acre and permits cultivation in one direction only, but renders training and spraying comparatively simple.

Hops receive generous manuring, and it is usual to apply the following, in rotation, over a three-year period: foldyard manure up to 20 tons per acre, shoddy at 2 tons per acre, and ground limestone at 2 tons per acre. During each growing season these are supplemented by applications of balanced fertilizers, but the quantity of nitrogen used is less than that recommended for Kentish soils.

During the previous winter soil is ploughed up to the stocks, and in late February is ploughed back into the alleyways. In March each plant is "cut" by removing the soil immediately around the stocks and cutting the bases of the previous season bines hard back to the crown (these bine bases are the "strap-cuts" used for propagation). In April many shoots or bines grow from the crowns, and in early May each string is furnished with two bines trained in a clockwise direction, the remainder being eliminated. The bines climb up the strings naturally until they reach the top wire—normally by late June. The leaves and lateral growths are then stripped off the basal 4 feet of each bine in gradual stages (a process known as "belting") to facilitate circulation of air and to prevent the upward spread of pests and diseases.

The soil is constantly cultivated with deep scuffles, followed by a Cambridge roll to eliminate weeds and promote a deep, moisture-retaining tilth. After "belting," a ridge of soil some 9 inches high is moulded to the bases of the bines.

**Pest and Disease Control** West Midland Fuggle growers generally prefer to eliminate pests and diseases by powdering. The hop-damson aphid (*Phorodon humuli*) is controlled with 4 per cent nicotine powder, Mould (*Sphaerotheca humuli*) with flowers of sulphur, and Downy Mildew (*Pseudoperonospora humuli*) with copper. Goldings, however, are very susceptible to Downy Mildew, and spraying is favoured by growers of these varieties. HETP was used as an insecticide against aphids in 1948, and had the added advantage of controlling red spider, which is a menace in some hop-yards.

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The "fluctuating" form of *Verticillium Wilt* (*V. albo-atrum*) is present in a few West Midland yards, but the dreaded "progressive" form, causing such serious losses in the south-east of England, has not been recorded.

Virus diseases are the greatest cause of loss to West Midland growers. Nettlehead, producing leaf-curl and sterility, attacks all commercial varieties and males. It is frequently found causing marginal infection of yards following the line of hedgerows, trees and ditches. Mosaic attacks Goldings and some males ("sensitives"), but is carried without symptom expression by the Fuggle, most Wye seedling varieties and some males ("tolerants"). It is a lethal disease, killing infected stocks in two years.

Little is known concerning the natural spread of these diseases, but partial control is obtained by grubbing infected stocks as they appear and segregating "tolerant" and "sensitive" varieties. The general impression today is that Mosaic infection is static, whereas Nettlehead is increasing and causing considerable anxiety.

**Picking and Drying** Picking starts early in September and goes on for three or four weeks. Pickers come mainly from the Black Country, are housed in barracks, and it is usual for one group to return to the same farm each year.

For the grower it is a period of great mental strain, and he must be capable of adapting himself to handle a diversity of events, ranging from strikes and maternity cases, to cut fingers and family squabbles, and, at the same time, preserving an ever-constant vigil over his unpicked fruit crop.

The bulk of the crop is still picked by hand into "cribs" constructed by suspending a canvas cloth over a ridged wooden framework. Pickers are paid by volume, the 1948 prices ranging from 10d. to 1s. 3d. per measure (10 gallons), depending on variety. Eight measures of green hops are placed in "green-sacks" or "pokes" and conveyed to the kilns for drying. A good picker will pick 15 to 20 measures per day. A few growers are now picking their entire crop by machine.

Drying is always done by the grower, the green hops being spread evenly on horse-hair cloths supported on a slatted wooden floor. It is normal to pass fumes of burning sulphur through the hops at the start of drying. A large proportion of West Midland hops are pure air-dried, so that the products of fuel combustion do not come into contact with the hops. Drying takes about ten hours to complete, enabling two loadings in twenty-four hours. The dried hops are carried on to the cooling floor and, when cool, are packed mechanically into long cylindrical bags ("pockets"), so that each holds 1½ cwt. of hops. In this state they are transferred to warehouses, where they are weighed and sampled before being sold to the brewer. The samples are used by the Hops Marketing Board for assessing the price of each pocket.



## FARMING IN SHROPSHIRE

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**F**ARMING in Shropshire covers a wide range of types, and there is a corresponding range of soils and climate. Indeed there can be few counties where there is so much variety on so large a scale. This is not surprising, for Shropshire is one of the larger English counties and extends to 856,622 acres. Rainfall varies from about 25 inches on the plain to 45 inches in the uplands, and elevation ranges from about 200 feet above sea level to 1,600 feet. The main industry is agriculture, and much of the life and work of the towns depends on the support of the surrounding countryside. The only real industrial area clusters around the Wrekin, and even there agriculture holds its place.

The county sweeps up from the great Midland plain westwards to Wales and southwards towards the Cleve Hills. Broadly the river Severn, which flows eastwards from its Welsh source to Shrewsbury and then turns south to leave the county at the Worcestershire border, is the dividing line between the plain and the upland. Among the more noteworthy physical features are the Wrekin, the Stretton Hills, the Clun Hills, the Cleve Hills, Wenlock Edge, and the meres around Ellesmere. Grass and arable crops thrive well and seldom suffer seriously from drought, due probably to the greater amount of cloud and the more humid atmosphere than prevails in the south and east of England.

**A Grassy Shire** Before 1939, apart from the arable area on the plain, Shropshire was traditionally a grass county. War and post-war needs have altered this, although there is still considerable emphasis on grassland. The following percentages of the total area of the county show these changes.

	1939 per cent	1948 per cent
Tillage .. .. .	14	27
Grassland .. .. .	67	52
Rough grazing .. .. .	7	6
Other land, roads, etc.	12	15

Livestock have always been important in the farming economy, and the county is a noted exporter of store cattle and sheep. At the spring and autumn fairs, held at a number of centres, buyers are present from all over the country.

Since 1939 the cattle population has steadily increased, but the decline in the number of sheep, necessitated by circumstances, has as yet only been arrested, and there is much leeway to make up. Pigs are still numerically low but poultry have steadily increased to within measurable distance of the 1939 figures. The following Table shows the position in 1939 and in 1948

	1939 (thousands)	1948 (thousands)
Cattle .. .. .	246.7	269.3
Sheep .. .. .	577.2	339.5
Pigs .. .. .	111.5	42.5
Poultry .. .. .	1,528.6	1,486.9

Approximately 10,000 holdings of over one acre make agricultural returns. In such a large county one might expect to find many large farms, but the contrary is the case. Farms under 75 acres represent over 70 per cent of the total and only 3.6 per cent are over 300 acres. Even in the upland areas farms of over 150 acres are the exception. Many of the farms are family concerns, and there are few large units with many employees. One-third of the holdings are farmed by owner-occupiers.

## FARMING IN SHROPSHIRE

Although there is great variety in farming practice, three main systems stand out : (a) intensive arable farming around Newport, Wellington, Shifnal, and Bridgnorth ; (b) intensive dairy farming in the north of the county, pivoted on Ellesmere and Whitchurch ; (c) cattle and sheep rearing in the south and west, centred on Bishops Castle, Craven Arms, and Ludlow.

**Arable Farming** Arable farming is associated with the more free-working types of soil. The main crops grown are barley, potatoes and sugar beet. Farms are normally larger on this class of land, and many are well equipped with labour-saving machinery. In cereal production, combine drills and combine harvesters are common, and potato planters and lifters and sugar beet lifters are in regular use. Although dairying has been introduced, the winter feeding of cattle and sheep is still the main livestock enterprise. On the lightest soils carrots are grown, but market gardening as such is very limited. Early potatoes are a popular crop and they are usually followed by sheep feed. Although there is much variation, rotations are normally based on three-year leys, and one in fairly general use is potatoes followed by sheep feed, wheat, sugar beet, barley, three-year ley.

The June 4 returns for a 230-acre farm give an idea of the distribution of crops and stock, as follows :

Cereals 47 acres, potatoes 21 acres, sugar beet 20 acres, roots 2 acres, leys 130 acres, permanent pasture 10 acres, cattle 114, pigs 108, poultry 35.

There are nine regular workers.

Fertilizers are used to a notable extent, well above the average for the county, and on the better farms yields per acre in the region of 35 cwt. grain, 15 tons potatoes, and 14 tons sugar beet are the normal expectation.

**Dairy Farming** Intensive dairy farming is typical of the northern part of the county. It is based largely on grassland, and prior to the war few tillage crops were grown in this area. Heavy stocking is characteristic and, with some exceptions, grassland is generally of good quality. Conditions are ideal for summer milk production, but for winter milk the need for adequate home-grown food is not always appreciated. The making of grass silage is spreading, and this, with the facilities for grass drying available, may well result in a farming policy based on grass for both summer and winter keep. The farm output is concentrated on milk. Before 1939 farmhouse cheesemaking was practised widely and, despite labour and other difficulties, the practice, continued on a small scale during the war, is gaining ground again. A number of milk depots are situated in this area. Pigs were kept in large numbers and, although considerably reduced, their association with the cheesemaking industry remains. Poultry keeping is fairly general and on the eastern fringe of the dairying district it has long been a major enterprise.

On a typical 40-acre holding, at present, tillage amounts to 11 acres, leys to 11 acres and permanent pasture to 18 acres. Livestock comprises 17 dairy cows, 5 pigs and 470 poultry.

There are some 5,500 dairy herds in the county. Of these nearly 400 are attested.

**Cattle and Sheep Rearing** In the district known generally as south Shropshire cattle and sheep rearing are the major enterprises, although there are isolated pockets of dairying and arable farming. Here is the home of the Clun sheep, and that breed, with its near neighbour the Kerry, tends to dominate the landscape. Often referred to as

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hill country, this is not strictly correct, for although much of the land is around 1,000 feet above sea level, and in some cases rises to a maximum of 1,600 feet, it is more truly upland country. In some ways it is unique, for the cultivation of oats, rape, etc. is often pushed successfully above the 1,000 feet level, and the tops of the uplands are often flat and covered with a great depth of very good soil. Welsh mountain sheep are found to a small extent, but crosses with the Welsh are innumerable.

The cattle are mostly Herefords. The cows rear one calf per year, and the prevailing practice is to sell the calf when "three half year" (18 months) old.

Economic conditions have played a great part in the state of farming in this district. For a long time prior to 1939 the industry was depressed, land reverted to bracken, gorse and heather, and farm equipment fell into disrepair. Since 1939, and particularly since 1945, there has been a marked renaissance. Bracken-covered hills are being reseeded and under the stimulus of the Hill Farming Act, where it can be applied, old buildings are being renovated and new ones erected. Many occupiers are carrying out such programmes entirely on their own initiative and without financial assistance.

Around Ludlow and in the lower part of Corvedale grass fattening of cattle is traditional and still remains a noted practice.

As an example of the type of farming carried on in the upland Clun area, the following figures are taken from a farm of 400 acres. Tillage amounts to 85 acres, leys 50 acres, permanent pasture 39 acres, and rough grazing 226 acres. Cattle number 70 and sheep 600.

**Difficulties** In writing about the farming in a county it is always a temptation to dwell only on the good points. It is true that Shropshire enjoys many natural advantages which help to make it a very desirable county in which to farm, but there are also difficulties. The Severn and its tributaries dominate the drainage of the county and, with the Teme and Onny in particular, can be very unruly at times, so that a good deal of land is liable to flooding. The Strine, Tern and Roden in the arable area flow sluggishly, and drainage of the arable land often presents difficult problems.

Much of the soil requires frequent applications of lime and is low in potash; on the Old Red Sandstone soils phosphates are deficient.

Opencast coal mining around the Wrekin does not make farming any easier in an area where the soil is already heavy and rather intractable. A number of large areas are fairly remote from railway communications and in the upland districts access to the farms is frequently poor.

Although many water supply schemes have been carried out during the past ten years, supplies are still short in some districts. Most farm supplies are from private sources, since the absence of large towns has not attracted public supplies.

But even with these difficulties Shropshire is a most attractive county in which to farm, and visitors to the Royal Show are certain to find interesting farming features by whichever route they come in to Shrewsbury.

## CORVEDALE

T. JESSE WADLOW

*Much Wenlock, Shropshire*

THE twenty-mile-long valley from Much Wenlock to Ludlow and Craven Arms is known as Corvedale. Strictly speaking, it includes more than the dale of the River Corve, because the source of this little tributary to the Teme (which it joins at Ludlow) is at the picturesque village of Bourton, three miles from Much Wenlock. The valley, however, extends to the southern side of the quaint old town, and the whole of it is in mind when any reference is made to this noted grazing district. About six miles from Ludlow the vale sprawls from the river and a branch of it hugs the northern bank of the valley until it reaches Craven Arms, where the biggest ewe sales in England are held. The name of the district provided the title for Lord Corvedale, the late Earl Baldwin's son, now himself the Earl.

**Crops** Much of the area is included in what has long been known as the "wheatland" district of Shropshire; this is the origin of the name of a pack of foxhounds, whose master is Miss Frances Pitt, the writer on foxhunting, wild life and nature study. This district is quite distinct in character from the rest of the county. As the term "wheatland" suggests, the land is rather strong and clayey—at least, that description applies to the dale itself and the southern bank of the valley; on the northern bank facing south the land is a medium loam on sandstone rock, "the old Ludlow sandstone rock formation". Although some of the best wheat is grown in the vale, this slope (reaching 900 feet above sea level in places) is eminently suitable for arable cultivation and sheep-farming. The well-known Wenlock lime works are only half a mile or so to the north, but the whole valley, unfortunately, is very deficient in lime, except where heavy dressings have been applied.

In addition to wheat, the district is noted for its livestock, and for the livestock forage it can produce. Excellent crops of clover, grass, and roots (including potatoes and sugar beet) are grown. In a very dry season a view of these crops would cause a countryman from the south or east to stand and stare in wonder. Oats, too, grow and yield well, with much more straw than is obtained on lighter or more southern soils. Splendid crops of barley are also grown, and one large fruit and market-garden farm has been operated successfully. The fact that quite good samples of malting barley are produced regularly at heights of 800 feet and over serves to show how one cannot always follow rules in farming; indeed, in very dry seasons some of the barley grown there actually surpasses that grown in recognized barley-growing districts, as the berry generally comes from the thresher plump and wrinkled, however dry the season.

**Livestock** Cattle are mostly grazed on the lower parts of the valley. Some of the turfs adjoining the foothills of the Brown Clee must be among the best in the country. The hay produced from them would, I think, be the equivalent of oats—many farmers have never in their lives seen hay like it. Several herds of pedigree Hereford cattle and flocks of Shropshire sheep used to be maintained, but the great depression of the 'nineties caused them to be dispersed, and only one or two remain. "He talked about his pedigree cattle, and the first cow that went into the ring was knocked down for £10," said the old foreman of the vendor at a farm sale of that period.

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Before the first world war, large numbers of well-finished fat cattle and sheep were produced and, besides large numbers sold at local towns, many went to Wellington auction by special train every Monday, from Much Wenlock and neighbouring stations—mostly those serving Corvedale. In the winter as many as thirty-five closely-packed trucks have been seen on the train. The meat situation will not improve appreciably until winter fattening starts again in earnest. An acre of mangolds will fatten four bullocks; an acre of grass, one. Meanwhile the present hotch-potch of dairying, rearing and a little fattening will continue in the district.

Sheep of the highest quality are bred, but not many Shropshires—only Cluns and Kerrys and crosses of these with the Down breeds. Prize-winning flocks of Cluns are to be found at the Ludlow end of the valley. Lambs (tegs), on beet tops and roots on the slope facing south, thrive unbelievably well with very little concentrated food, and no-one seems to know just why—"A thousand things are hidden still and not a hundred known." Perhaps the exceptionally good clover and ryegrass put in the racks have something to do with it. Strange as it may seem, crossbred lambs from the Cotswolds thrive best of all, although the ever popular Clun lambs rival them closely. It would astonish the breeders if they could see in March or April what their lambs had grown into. Unfortunately, pulpy kidney disease is becoming a menace to teg-fattening—especially while they are on swedes; it is hoped that inoculation against the disease will lessen the trouble.

Horses grow strong and big, and many prizes have been, and are being, won each year at the leading shows by a well-known enterprising breeder near the Wenlock end of the valley. Of course, such land is good for the horses' feet. No foot, no horse; but, in addition, horses in Corvedale develop good size, bone, and muscle.

Store stock markets nearby are Bridgnorth, Craven Arms, and Ludlow. These auctions are known over a great part of Britain.

The Corvedale pastures have to put up with much punishment, and their management cannot be said to be beyond criticism, for they are grazed too much in winter and are too bare by May Day to give the best results. In former times grassland was not worth studying—it was useless to grow grass intensively when the eating of it produced no profit. However, the pastures have improved to some extent recently, and in one or two places big bunches of satin-coated Hereford bullocks can be seen grazing luscious pastures with evident enjoyment.

## THE HARPER ADAMS AGRICULTURAL COLLEGE

W. T. PRICE, B.Sc.

*Principal*

**T**HE Harper Adams Agricultural College was founded under the trusts of the will of Thomas Harper Adams (1816-92), the last representative of an old Shropshire family. The family was associated in the eighteenth century with the famous Lord Anson, and the connection has been perpetuated in the coat of arms granted to the founder of the College and his brother and is now retained by the College; the wording of the crest is *Utile Dulci*.

The official opening ceremony was performed in September, 1901, by the Rt. Hon. R. W. Hanbury, M.P., then President of the Board of Agriculture, and since that date the College has continued without a break to give instruction in agriculture and the allied sciences.

## THE HARPER ADAMS AGRICULTURAL COLLEGE

The College was built in the Renaissance style, and the main block of buildings now covers over three acres. Situated about midway between Shrewsbury and Stafford, some 2½ miles to the west of Newport, it is in the heart of one of the finest agricultural districts of the country. The site is on the New Red Sandstone formation at an elevation of 250 feet above sea level, looking across the open but well-wooded country of the Shropshire Plain to the Wrekin, some eleven miles away, with the Welsh mountains in the distance.

The Ministry of Agriculture and Fisheries, the five counties of the West Midlands (Herefordshire, Shropshire, Staffordshire, Warwickshire and Worcestershire), and the City Councils of Birmingham and Coventry make annual grants towards the maintenance of the College, which is controlled by a Board of Governors, of which the present Chairman is T. C. Ward, Esq.

The National Institute of Poultry Husbandry, occupying some fifty acres, was established on the College farm in 1925 and was formally opened by H.M. King George VI (then H.R.H. the Duke of York) in November, 1926. The work of the Institute, which is part of the College, is devoted first to the development of specialized courses in poultry, waterfowl and rabbits, and second to the investigation, under practical conditions, of problems and new ideas in connection with poultry husbandry.

The present accommodation for students (mainly resident) is 150; this is being increased to 175 by the building of another hostel. The Ancellor House, the original home of the founder, has accommodation for twenty women students. The residential accommodation comprises study-bed-rooms, with the usual common rooms, recreation rooms and library.

The College is exceptionally well equipped with science laboratories and workshops.

Some 20 acres of playing fields provide facilities for the chief outdoor sports, and there is also suitable provision for indoor amusements. The various social and athletic activities of the College are controlled by the Students' Union Club, and the *Cat-a-Mountain*, which is the official magazine of the Club, is published annually.

The association of former students, known as the Harper Adams Club, acts as a link between past and present students.

**The College Farms** The College farms cover an area of 340 acres, of which 50 acres are under poultry and 20 are devoted to gardens and orchards. The farm itself is partly heavy soil, boulder clay, and partly light land of the New Red Sandstone formation, and at present the cropping is almost equally divided between arable and grassland, of which an increasing proportion is long ley. In addition to providing for the winter requirements of the farm livestock, the arable land produces a wide variety of cash crops, including wheat, barley, linseed, potatoes, and sugar beet.

A dairy herd of 60 attested and abortion-free Ayrshire cows is maintained by rearing the young stock. In the autumn Hereford store cattle are bought for fattening on grass in the following summer. A small flock of 60 breeding ewes (Clun) is crossed with Shropshire rams to produce lambs for folding on sugar beet tops. The farm buildings have been modernized and re-equipped, and mechanization, both for the land and livestock, has been fully developed.

The objects kept in view in the management of the farms are to make them as instructive as possible by using them as demonstration farms for student classes, to give students an insight into the practical management of a "mixed" farm, and to carry out experiments on agricultural problems, including tests of crop varieties, under the auspices of the National Institute





Shropshire, cradled in the Severn



Photo: *Farmer's Weekly*

Attested, in-calf dairy heifers at Mixon Hay, Staffs. The stock are bought locally, raised by the Staffs. A.E.C. and sold either as bulling or in calf heifers.



Photo: *Kerr's Wansley*

#### Ludlow

*The Towne doth stand most part upon an Hill,  
Built well and fayre, with streates both large and wide.*

Thomas Churchyard



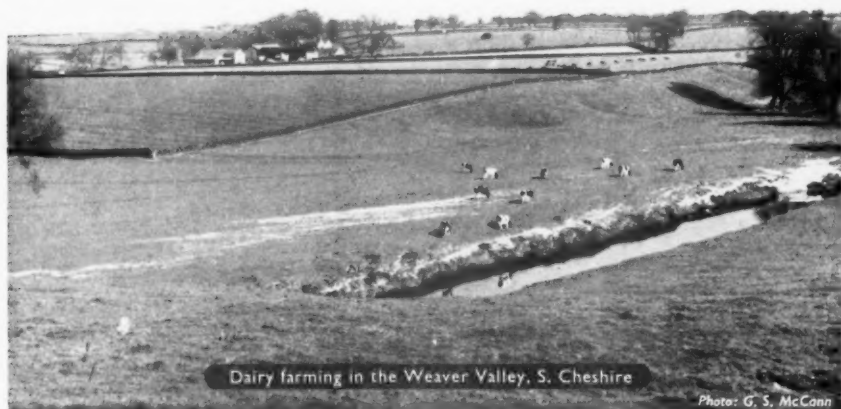
Herefordshire. Cider apple bush Plantation

Photo: Long Ashton Research Station



Worcestershire. Plum Plantation

Photo: Long Ashton Research Station



Dairy farming in the Weaver Valley, S. Cheshire

Photo: G. S. McCann

## HARPER ADAMS AGRICULTURAL COLLEGE



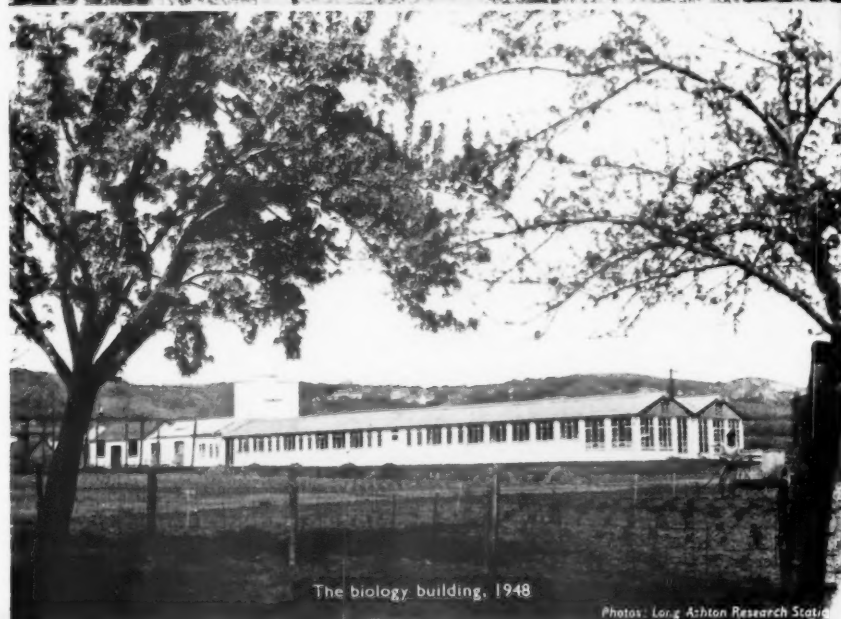
Front view of the College.



Photo - Horace Hall

A section of the poultry rearing ground, showing young stock in Sussex Arks.

## LONG ASHTON RESEARCH STATION



## HOP GROWING



Continuous stringing in progress in a West Midland hop-yard.

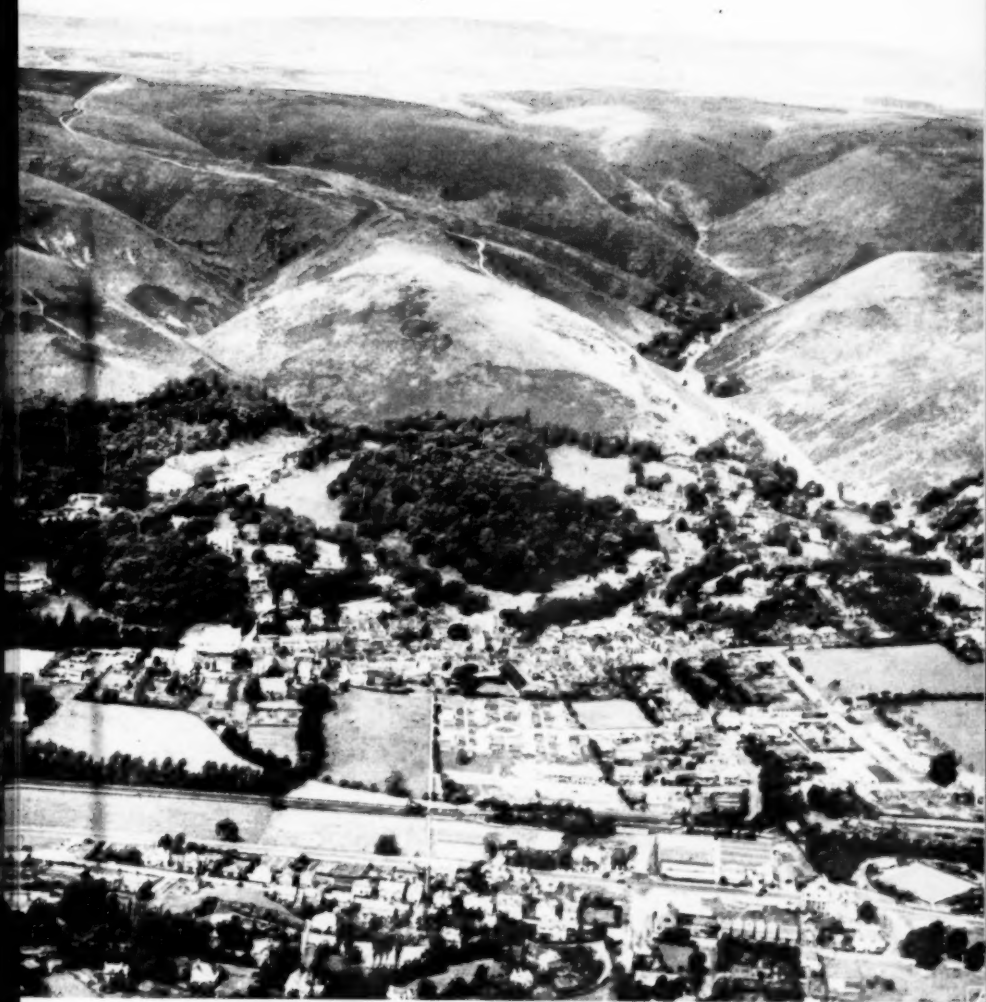


Harvest time. Note the crib and wickerwork basket used for measuring the hops.



WEST MIDLAND SHEEP





Long Mynd, Shropshire

Photo: Aeroflex

## THE HARPER ADAMS AGRICULTURAL COLLEGE

of Agricultural Botany, Cambridge. Parties of farmers frequently visit the farms, which it is essential should be run on commercial lines and show a reasonable profit, for they are not grant-aided like the College itself.

**Pigs and Poultry** In August, 1948, the Experimental Station was reopened for the study of problems in pig husbandry. Although a certain amount of nutritional work will be carried out, the main emphasis will be on breeding problems. Several breeds are kept and an attempt is being made to assess the value of hybrid vigour; also an interesting experiment is being conducted in "dual mating" by serving a sow at the same heat period with two boars of different breed, thus producing pure-bred and cross-bred pigs in the one litter.

A test is also being made to ascertain how far high-grade dried grass cubes can replace the normal protein in the fattening ration.

The Poultry Institute has its own instructional buildings and an extensive plant dealing with all aspects of poultry husbandry, including advanced instruction and experimental work. Representatives of the leading present-day breeds of poultry are kept for instructional purposes, while the large experimental flocks of the standard commercial breeds also are available for educational work.

The Institute is organized in three Departments—Poultry Husbandry, Waterfowl Production, and Rabbit Husbandry. The Poultry Department is subdivided into egg, table poultry and turkey production; the Waterfowl Department into table egg, table duck, and goose production, while the Rabbit Department deals with pelt, wool, and flesh production. Most of the experiments are concerned with economic problems and are so designed that the results will be directly applicable to ordinary practice. With this in mind, relatively large units are used and experiments are often repeated to ensure reliable results.

Poultry on the farm is dealt with by fold units and slatted-floor houses both for laying stock and the rearing of pullets, since poultry are now considered as much a part of the farm economy as the other forms of livestock. Folded poultry, in conjunction with cattle and sheep controlled by electric fencing, are used to maintain fertility in the lighter arable land.

An investigation is at present being made into the relative costs of producing eggs on the three systems: laying batteries, intensive housing, and fold units.

**Courses of Instruction** The courses at the College, which are of two main types—agriculture and poultry—are designed for intending farmers and those who propose to take up salaried posts. The agricultural course is for male students only. The degree course preparing for the London external B.Sc. degree is temporarily suspended, in view of the large demand from ex-service men who wish to take a Diploma Course.

**AGRICULTURAL (FARM MANAGEMENT) COURSE.** This is a two-year course arranged to prepare for the College Diploma in Agriculture and for the National Diploma in Agriculture. It lays emphasis on farm engineering and machinery, and is of particular benefit to those who intend to manage land, in the capacity of owner, farmer, manager or bailiff; the course also prepares students for salaried posts in the instructional, administrative, or commercial fields, either at home or abroad.

The conditions of entry are the School Leaving Certificate or equivalent qualification which can be met by the College entrance examination, and at least one year's practical farming experience to cover the farming calendar.

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Whilst practical experience on the farm must always form the basis of an agricultural training, it can no longer be regarded as sufficient in itself. The design of the two-year agricultural course is to give the future farmer a broad outlook and a knowledge of fundamental scientific facts so as to take full advantage of the continual improvements in cropping, livestock, management, mechanization, economics and marketing, all welded together and applied under the heading of Farm Management.

At an agricultural institution the prospective farmer or technical adviser has the advantage of personal instruction by staff with special knowledge of all branches of scientific and practical agriculture. At the same time a student in a residential college comes into close contact with many different types of mind amongst his fellow students which cannot fail to have a broadening effect upon his own outlook.

**POULTRY HUSBANDRY COURSE.** This course of instruction of two years' duration prepares for the College Diploma and for the National Diploma in Poultry Husbandry, and is suitable either for the prospective poultry farmer or for the salaried posts. There is no degree in poultry husbandry, and the N.D.P.H. is the highest academic qualification that can be obtained in this field.

Qualifications for entry are the School Certificate or College entrance examination, and a period spent on an approved poultry farm.

**LIVESTOCK HUSBANDRY.** It is proposed to introduce a one-year post-graduate course in Livestock Husbandry which will be open to students who hold a degree in agriculture or the allied sciences. Emphasis will be given to genetics and the science of breeding for all classes of farm livestock, with special reference to poultry and pigs.

### **Appointments held by Past Students**

Since the College was opened nearly fifty years ago a large number of students have passed through both the agricultural and poultry sections. Many former students have taken up practical farming, while others have found a wide range of salaried posts open to them. Former students are located all over the world in national and colonial appointments, administrative, instructional and commercial.

With the vital need for maximum world food production, prospective agricultural or poultry students can look forward with confidence to their future careers, provided they have equipped themselves with the necessary qualifications covered by the term "practice with science".

## LONG ASHTON RESEARCH STATION

T. WALLACE, C.B.E., M.C.

*Director*

**L**ONG ASHTON Research Station, which is administered by the University of Bristol, is one of the two national research institutes concerned primarily with problems of fruit-growing. Its work, although national in character, has always had a West Country bias and throughout its history the Station has given special attention to problems of growers in the West Midlands and South-West. Its origin and history are typical of West Country enterprise, and incidentally they serve to illustrate the

## LONG ASHTON RESEARCH STATION

way in which many of our national research and educational institutions have arisen and flourished from the foresight and efforts of enthusiastic pioneers.

The Station had its origin in a scheme for experiments in cider-making, started in 1893, with the support of the Bath and West Agricultural Society, by Mr. R. Neville Grenville, on his estate at Butleigh Court, nr. Glastonbury, Somerset. Mr. Grenville had worked with the Society on its scheme for giving instruction in cheese-making on farms, and was so struck by the improvements which had resulted that he determined to apply similar methods to cider-making, which at that time was carried out on farms entirely by rule-of-thumb practices. The problem, however, differed from that of cheese-making, since nothing was known of the principles of cider-making, and hence the subject could not be taught. The situation did not daunt Mr. Grenville. He recognized that the first step should be to carry out research on cider-making processes. An appeal to the Board of Agriculture for funds to enable him to begin work met with refusal on the grounds that the Board did not finance research but only gave grants for education. In spite of this refusal, Mr. Grenville began his experiments on his farm at Butleigh, with the support of the Bath and West Society and the help of his old colleague of the cheese school, Mr. F. J. Lloyd, a chemist by profession. After a while the support of the Board of Agriculture was gained, when Mr. Grenville was able to demonstrate to one of the Board's inspectors, Mr. R. Brooke Hunt, by means of a visitor's book, that the experiments were essentially educational in character.

### **The National Fruit and Cider Institute**

The work continued in the original quarters for ten years, by which time its great value had become recognized not only by the Board of Agriculture but also by a wide circle of farm cider-makers and the County Councils of the cider-making counties. Thus it came about that in 1903 a scheme was evolved to transfer the experiments to a centre where the work could be developed under more favourable conditions. The scheme, in which Mr. Brooke Hunt played a leading part, was sponsored by the Board of Agriculture, the Bath and West Society, and the County Councils of Devon, Gloucester, Hereford, Monmouth and Worcester, all of which undertook to provide annual grants to establish a small research centre. The final outcome of these efforts was the formation of the National Fruit and Cider Institute, with a membership scheme for farmers and others interested in cider-orcharding and cider-making. In 1904 the Institute acquired premises for its work at Long Ashton on a farm belonging to the Ashton Court Estate, consisting of a farm cottage for use as an office and a small farm building which was converted into a small factory. To these was added a small wooden lean-to structure to serve as a laboratory. Along with these buildings, eight acres of adjoining land were obtained for experiments on cider-orcharding, the whole of the property being held on lease.

A young Cambridge graduate, B. T. P. Barker, who later became the first Director of the Long Ashton Research Station, was appointed to initiate and carry out the scientific experiments, and it is of interest to relate that Professor Barker (as he now is), though retired from the post of Director, is still hard at work in his laboratory at the Station, applying the latest methods of science, with all his old enthusiasm, to some of the more baffling problems which he first encountered during his earliest years at Long Ashton.

The optimism and faith of the founders of the National Fruit and Cider Institute can be gauged from the fact that the total annual income of the

## LONG ASHTON RESEARCH STATION

Institute in those early years was about £1,100. The Institute continued to function as an independent body until 1912, when it became associated with the University of Bristol as one of the agricultural research institutes established by the Ministry of Agriculture and the Development Commissioners with grants made available by the Development Act of 1909. In its new role the Institute was asked to undertake research on problems of "Fruit Culture and the Practical Control of Diseases and Pests of Fruit Trees," in addition to its original subject of cider.

To enable the Station to carry out its new programme the University purchased the farm, comprising 257 acres, on which the original premises were situated, built a new range of laboratories and erected a cider factory to permit large-scale experiments being carried out. Developments under the new scheme, however, were arrested by the 1914-18 war, and it was not until 1919 that a substantial expansion of activities began. In this latter year new appointments were made to the scientific staff and new field experiments were planned on both commercial and cider fruits.

Concurrently with the acquisition of its new status in research, the Station became the Agricultural Advisory Centre for the Bristol Province and continued to serve the farming community in this way until 1946, when this work was transferred to the National Agricultural Advisory Service.

Since 1919 the work of the Station has shown steady expansion which has necessitated greatly increased staff and accommodation. In 1919 the total scientific staff numbered 7, whilst in 1939 there were 22 qualified scientists; by 1947 this number had increased to 31, and it had been found necessary also to appoint a considerable number of technical assistants. To meet accommodation requirements two further additions were made to the laboratories in 1927 and 1932, and a new biology building was erected in 1947. The Station also possesses various special-purpose buildings, including experimental greenhouses and workshops. The field experiments, which occupied about 8 acres in 1919, now occupy an area of approximately 120 acres and, in addition, the Station has established many experimental cider fruit orchards on private farms, particularly in the cider-making counties of the West.

One further subject of interest was added to the Station programme in 1922—that of willow culture and the utilization of willows; these industries are of importance, especially in central Somerset around the historic Isle of Athelney and in various small areas scattered over England and Wales, for all of which Long Ashton serves both as a research and advisory centre.

No account of the early activities of Long Ashton would be complete without reference to its Annual Cider Tasting Day. This function, whose main object was to keep farmers and others interested in cider-orcharding and cider-making in close touch with the results of research, was held annually up to 1939 at the Institute on the first Thursday in May. It attracted farmers from all parts of the West Country and did much to improve and popularize cider, even to the extent of raising it from a local to a national drink. Since the recent war it has been necessary to restrict the day to a cider sampling function attended only by experts.

The 1939-45 war naturally disorganized to some extent the main lines of fruit research, and the Station undertook many special war-time problems appropriate to the special scientific qualifications of the staff and the equipment available. Since 1945, however, most of the special war-time investigations have been concluded and a comprehensive programme of fruit research has been planned and put into operation.



## LONG ASHTON RESEARCH STATION

**Current Research Work** The main subjects of research with which the Station is concerned at the present time may be grouped under the headings of Pomology, which embraces the general subject of Fruit Culture; the Control of Insect Pests and Fungoid and other Diseases; the Manufacture of Cider and other Fruit Juices, the Domestic Preservation of Fruit and Vegetables; Plant Nutrition, including both agricultural and horticultural crops; and Willow-Growing and the Utilization of Basket Willows.

During past years the Institute has also been concerned with Soil Surveys and Diseases of Vegetables and Hops—but these subjects have now been transferred to other centres.

**Pomology** The first systematic researches in pomology in this country were initiated in 1894 at the Woburn Experimental Station by the Duke of Bedford and Mr. Spencer Pickering, and were continued until 1922. The results obtained were not widely accepted by practical fruit growers, but they gave rise to much controversy both among growers and scientists and showed the complexities of the problems involved and the need for comprehensive investigations. Many of the problems examined at Woburn were later re-examined at Long Ashton and often formed the starting points of studies which have since yielded valuable practical results.

The main problems in pomology concern factors which govern the growth and fruitfulness of trees and the quality of the fruits produced. At Long Ashton these problems have been approached with two objects in view: to solve the fundamental scientific problems involved, and the special practical problems of the West Country grower.

The scientific problems concern the intrinsic qualities of the fruit plants themselves and the effects of the orchard conditions (i.e., the environment) on the plants. As regards the plants themselves, each different class of fruit, and even each variety, may present its own particular problems. For practical purposes it is thus dangerous to generalize from limited investigations on the behaviour of fruit in general or on any class of fruit. Again, these intrinsic qualities may be modified greatly by natural orchard conditions and management practices, such as climate, soils, cultivations, manuring, pruning, and the control of insect pests and diseases. The effects of these different factors and their interactions must all be determined if vegetative growth and cropping are to be controlled.

In fruit trees the rootstocks on which the varieties are budded or grafted produce important effects on growth and fruitfulness, and rootstocks may be raised either vegetatively, by means of layers and stools, or from seed. The latter method has always been preferred for West Country orchard trees, and hence Long Ashton has made a special study of seedling rootstocks.

Tree forms (bushes, standards, dwarf pyramids, cordons, etc.) and pruning systems are perpetual subjects of controversy among growers, and Long Ashton has continued to devote attention to them. In the early days, the late Mr. A. H. Lees examined the "Lorette" method of spur pruning and the intensive methods of growing upright cordons and dwarf pyramids. Later, Dr. T. Swarbrick and Mr. C. R. Thompson compared the merits of "open centre" and "modified leader" tree forms for apples and pears, and Mr. Thompson subsequently developed his now well-known method of renewal pruning. More recently the ancient method of growing cider fruit on standard trees in grass orchards grazed by stock has been challenged by trials of bush trees, which have been shown to produce heavy yields as early as 8 to 10 years after planting.

## LONG ASHTON RESEARCH STATION

Much attention has also been given to problems of fruit quality, both for commercial purposes and for cider-making, and, as a result of this work, quality can be controlled to a considerable measure.

The latest method of attacking these problems of regulating growth and fruitfulness has been by the use of growth-promoting substances or "hormones". In these studies an attempt will be made to discover the particular substances responsible for the various stages in the production of fruits and for determining keeping quality. Can we, in fact, by such means, initiate fruit buds, cause fruit to form from blossoms without pollination, and prevent the dropping of fruitlets in June and later when fully grown? Then, after picking, can we prolong or accelerate the storage life of the fruits? Good progress has been made with some of these problems, and already a natural hormone has been isolated from the seeds of apple fruitlets which will swell tomato fruitlets and appears to prevent the "June drop" of apples.

**Fruit Nutrition** The investigations on fruit nutrition have conferred great benefits on the fruit-growing industry. They have provided a basis for manuring the various classes of fruit, suggested alternative methods of cultivation to the one-time universal arable method, and have enabled many soils previously considered as unsuitable for fruit-growing to be utilized to great advantage for this purpose. The problems were attacked from the simplest beginnings, since it was recognized that to get down to fundamental points the complications occurring in orchards had to be avoided. Thus in the initial stages the various kinds of fruits were all grown in sand in large clay pots, where conditions of feeding, watering, etc., could be readily controlled, and the plants were fed on different mineral diets. The main effects of deficiencies and excesses of nutrients were determined and the knowledge gained was tested on special experimental plots at the Station and in growers' orchards and plantations. In this way the main problems of different kinds of soils and the effects of different manures on the various fruits were ascertained, and methods for the correction of unfavourable conditions devised.

The most important points which emerged were that potassium deficiency was the cause of the condition known as Leaf Scorch and that potash was of paramount importance in the nutrition of all classes of fruits.

Another point of importance was the recognition of the relation of fruit colour and quality to nitrogen supply—a finding which enabled growers to regulate colour between red and green by means of regulating the nitrogen supply to the trees. The investigations also brought into prominence the relationships of grass and arable systems to nitrogen nutrition. Later it was shown that, besides the importance of nitrogen and potassium problems in orchards, deficiencies of magnesium, iron and manganese were of common occurrence, and means of correcting these were devised and are now in common use by growers.

Considerable attention was also given to soil surveys, in which soil conditions were related to the growth of fruit plants, the most important areas surveyed being the Old Red Sandstone areas of Herefordshire and Worcestershire, the Vale of Evesham, the Cheltenham market-garden area, and the cider-growing district around Martock, Somerset.

**Fruit Quality** Brief reference must also be made to the long series of experiments carried out to determine the effects of orchard factors on the eating and keeping qualities of fruits, mainly of apples. The problems are again complicated owing to the various inter-

## LONG ASHTON RESEARCH STATION

actions of the factors involved, but the investigations clearly showed the main effects due to the factors of varieties, rootstocks, cultivation, manuring, pruning, bark ringing, position of fruits on the tree, time of picking, and size grades within a crop. The knowledge is basic to any attempt to regulate quality to suit the eye and taste of the customer, and to the adoption of orderly methods of storage and marketing without risk of losses from storage rots and physiological disorders.

**Fruit Breeding** Breeding new varieties of fruits is a long-term business, and because of this and of the large areas of land required to grow the seedlings, it is very expensive. Long Ashton experiments, initiated over twenty years ago, have only recently begun to give new varieties to the industry. Several varieties of apples have reached the stage of the Wisley trials; two pears (Bristol Cross and Cheltenham Cross) and one plum (Severn Cross) are finding favour with growers; and three varieties of black currant (Mendip Cross, Cotswold Cross and Malvern Cross) are being widely planted. In the most recent experiments attention is being given to the filling of gaps in present supplies, especially the extension of fruiting seasons by the addition of early and late varieties, and to producing cider varieties with special qualities.

It will be noted from the varieties named above that Long Ashton seedlings are all given West Country names.

**Control of Insect Pests and Fungoid and Other Diseases** The control of pests and diseases in the orchard is perhaps the most expensive item in the annual budget of fruit production, and there is no escape from this expenditure if fruit of good market quality is to be produced. For this reason the subject has always been prominent in the Long Ashton programme of research.

In 1920, methods of control were both primitive and unsatisfactory. Lime-sulphur was little used and indeed was suspect in its effects, there were no winter washes, and many present-day varieties, such as Cox's Orange Pippin among apples and Williams among pears, were not regarded as commercial sorts, mainly due to the effects of Scab. Older plum growers will also remember "aphis years" in the Vale of Evesham in the early 'twenties, before tar oil washes were introduced, when trees and crops were devastated.

The necessary research for pest and disease control involves studies of the pest and disease organisms, chemical materials for sprays and dusts, and machinery for applying them. Long Ashton has included all these items in its programme.

Perhaps the starting point of the modern improvements in methods of control was the introduction of the first tar oil winter wash from Holland in 1921 by S. P. Wiltshire, then mycologist at Long Ashton. The wash was tested during the following year by A. H. Lees and was found to kill the eggs of a number of important fruit pests which overwinter on the bark of various tree fruits and bushes. This discovery revolutionized plum-growing and solved many major problems of pest control of apples, pears, currants, and gooseberries. The wash was quickly improved at Long Ashton by F. Tutin, who also determined the active "egg-killing" constituents of the wash. Later, a team of workers led by H. Martin, H. G. H. Kearns and R. W. Marsh settled down to the formulation of complete seasonal spray programmes for the various fruits, by developing "combined" and "multiple" sprays calculated to control the majority of

## LONG ASHTON RESEARCH STATION

the major pests and diseases when applied in succession during the winter and spring months

Problems of control, however, are not static: new pests and diseases come into prominence, necessitating continuous research and changes of programme.

The present team at Long Ashton comprises entomologists, mycologists and chemists who are competent to attack problems of pests and disease organisms, chemical materials used in sprays, and technical problems of spraying machines and equipment. The Station has a small engineering shop, which, incidentally, was in continuous use during the war for improving and servicing spraying outfits supplied by the Ministry of Agriculture for the use of County War Agricultural Executive Committees.

Virus diseases have not been special subjects of study at Long Ashton, although important contributions have been made in this field also. For example, A. H. Lees first showed "Reversion" of black currants to be due to virus disease and to prevent its spread he developed the system of "roguing", which is still in use. Recently attention has been given to possible virus diseases of tree fruits, and already three of importance, all transmissible by grafting, have been recognized—"Mosaic" and "False Sting" of apples and "Stony Pit" of pears—whilst curious conditions of the apple variety Lord Lambourne, known as "Rubbery Wood," "Chat Fruit" and "Flat Limb," and a condition similar to "Rubbery Wood" in some plum varieties, which may all be due to viruses, are being studied. The importance of these investigations will be apparent to growers who have suffered the devastations of virus diseases in soft fruits.

**Cider and Fruit Products** Cider is, of course, the "old love" of the Station, and to the local population the Research Station is, and may always remain, "The Cider Institute". Cider fruit-growing and cider-making have throughout been major subjects of research. The problems of cider-making concern the raw materials used, the expressed juice, fermentation, the storage and maturing of the product, and organisms which may cause spoilage.

It is difficult in a short article to provide any adequate picture of cider researches at the Station, but the significance of the work may be judged from the facts that during the life of the Institute cider has developed from a local farmhouse drink to become a national beverage, and cider-making from a farmhouse occupation to an industry. Moreover, many of the larger cider-makers have developed from the farm stage after training at Long Ashton, and today, as always, the Station continues in the closest touch with, and enjoys the complete confidence of, the industry. These links, at the present time, are kept strong by means of Institute Committees, on which sit representatives of cider-growers and cider-makers, to deal with the problems of cider fruit supplies and of cider-making.

In cider-orcharding the main problems relate to the orchard and cider-making qualities of varieties and to devising management practices appropriate to the value of the crops.

The problems arising from cider manufacture are very varied and require, in particular, intensive studies in biochemistry and microbiology. Large-scale problems are dealt with in the Institute factory, which is now rather old-fashioned, but it is hoped soon to have a model building to carry out pilot-scale experiments in both cider-making and the manufacture of fruit juices.

Fruit products investigations were a natural extension of the cider experiments. The general problem presented was: Could a range of

## LONG ASHTON RESEARCH STATION

products be made from the apple and other fruits, ranging from non-alcoholic beverages to products of high alcohol content such as apple brandy and liqueurs? The main object of these extensions in the work was to develop methods of utilizing fruit surpluses and low grades of produce which result from grading and marketing schemes.

Preliminary work showed that a wide range of attractive products could be made from the different fruits and, later, attention was focused on two outstanding products—pure apple juice and black-currant syrup. The work was interrupted in 1939 by the war, when apple juice manufacture was restricted, but it will be recalled that the blackcurrant syrup was used throughout the war period as an important source of vitamin C for children. Other developments which arose from this work were the cold sulphur dioxide process for preserving commercial fruit pulp and its domestic counterpart, the well-known Campden preserving tablets used in fruit bottling operations.

### **Fruit and Vegetable Preservation Methods**

This subject is scientifically closely related to the subjects of cider and fruit products. The work arose out of official schemes for domestic preservation of garden produce during the 1914-18 war. It aims at providing methods of preservation which can be used either in the home or in rural centres run by organizations such as the National Federation of Women's Institutes. The Station undertakes the basic research for the methods and also provides annual summer courses for instructresses employed by County Councils and other bodies engaged in teaching domestic science subjects. Many readers will be familiar with such publications as the Ministry's bulletin *Domestic Preservation of Fruit and Vegetables*, and the Penguin book *Preserves for all Occasions*, which are based on the Long Ashton work.

### **Plant Nutrition**

This section deals with special aspects of the nutrition of the whole range of agricultural crops. It was formed during the war by the Agricultural Research Council to give special attention to problems of crop failures and the particular problems of trace elements, such as boron, manganese, and iron. It was important at that time to develop quick methods of diagnosis that could be used by advisory officers and farmers. To provide for this, rapid visual methods, supplemented by spraying and injection techniques and quick chemical tissue tests, were developed and put into use. The methods were described and illustrated in a special colour atlas\* published by H.M. Stationery Office, on behalf of the Agricultural Research Council. They were also used to make rapid surveys of crop nutrition problems in special areas of the country where new and difficult problems had arisen from the war-time ploughing-out programme. Since the war the investigations have been extended to examine special problems, such as the reasons for crop failures on acid soils, the causes of iron deficiency in crops, and the significance of molybdenum in crop production. The investigations may be expected to make important contributions to the solution of important and obscure problems of crop production and maybe also of animal health.

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\* T. WALLACE. *Diagnosis of Mineral Deficiencies in Plants by Visual Symptoms—A Colour Atlas and Guide*. 1st edition 1944. 2nd edition in the press.

## LONG ASHTON RESEARCH STATION

### **Willow Culture and the Utilization of Basket Willows**

The cultivation of basket willows is carried out in small areas throughout England and Wales, notably in Somerset and the Trent Valley. The industry is rather unstable, due to its inherent nature and to intensive competition from abroad, but is important in the agricultural economy of certain areas and has proved of importance to the national effort in both world wars. Long Ashton has endeavoured to help the industry both as a research centre and in an advisory capacity.

The main research problems concern the improvement of varieties and methods of culture, and the devising of improved methods for peeling and preparing rods for market. The control of diseases and pests presents very difficult and important problems in attempting to produce rods of high quality and greatly improved methods for controlling these have been evolved. Considerable help has also been given to growers of cricket bat willows. The Station has its own willow beds, which contain a large number of seedling varieties bred during the course of the work.

**Conclusion** The above account of the work of the Station is of necessity superficial and deals inadequately with many important research activities. It is hoped, however, that it will provide a general picture of the Station's work and enable readers to see the part which Long Ashton is endeavouring to play for the benefit of agriculture, both locally and nationally. Those specially interested in the subjects outlined in this review may keep in touch with the work of the Station through its Annual Report, which contains both scientific and practical reports of researches in progress and of results of completed investigations.

## SHEEP ON THE ENGLISH-WELSH BORDER

J. F. ROBINSON, B.Sc.

**T**HE historic town of Shrewsbury is a popular choice for this year's Royal Show, not least because it is one of the oldest livestock centres in the kingdom. In addition to its Hereford cattle, the Welsh Border country is the home of four breeds of sheep—Ryeland, Shropshire, Clun Forest, and Kerry Hill.

**Historical** The special characters of these local breeds of sheep have been chronicled by many early writers. Modern improvements date from about the time of Bakewell, chiefly through the introduction of New Leicester and Southdown blood. The Ryeland, originating in south Herefordshire, is one of the oldest breeds of which there are records. Old references claim for it two distinctions—the extra fine quality of its wool, and a natural propensity for thriving on scanty fare. These points remain as true as ever, though one's chief impression today would surely be the animals' compact, symmetrical conformation.

Further north the Shropshire, which is characteristically "Down," and (indirectly) the Clun Forest, have evolved from crosses of the Southdown on the old local races, especially the Morfe Common and Long Mynd Mountain sheep. The latter are now extinct, but a few sheep of a similar type—the "Radnors"—are said to remain. Youatt, writing about 1830, records that the Morfe Common resembled the old Ryeland. It may now seem rather odd that it should be noted "this ancient breed are black-faced, or brown or spotted-faced, horned sheep—and of a slow-maturing



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type." Present-day breeders must read these old accounts not only with amusement but also with the pride of accomplishment.

The Kerry Hill was originally an improved mountain type, but its subsequent improvement has been on similar lines to that of the Clun Forest. There are historical references to an exchange of rams between the two breeds, but since about 1850 improvement has chiefly been by selective breeding, especially for the distinctive face colours and hardy breeding qualities.

**Distribution :** The Ryeland is a lowland breed kept chiefly for ram-breeding and supplying stock sheep for overseas. Most of the pedigree flocks are in Herefordshire and the neighbouring counties. Others are scattered in different parts of the country, mainly in the south.

**The Ryeland** Like fruit, for which this county is also renowned, Ryelands appear to do best in a dry, sunny climate. Being a thrifty type of sheep, they will do remarkably well on poor land. At one time a number of flocks were established around the Tonbridge area in Kent, where the Ryeland rams, like the Southdowns, were sold for crossing with the Romney Marsh ewes. The market now requires heavier sheep, though the small breeds, such as the Ryeland or Southdown, are still a useful choice for crossing to get high-quality summer fat lambs, or with "first-crop" ewes to avoid difficulties at lambing.

Unlike the Down breeds, the Ryeland has developed chiefly on grassland. In Herefordshire, for example, it is more typical of the mixed stock and fruit farms than of the strictly arable farms found in the Wye Valley. In many respects, the Ryeland is an answer to those who think that conformation of the Down type cannot be developed and preserved except under systems of continuous close-folding on arable crops.

Like Hereford cattle, Ryeland sheep have proved their adaptability under different conditions both at home and abroad. It is questionable, therefore, whether the Old Red Sandstone on which the breed originated is of importance for keeping them true to type, though when bred in other areas they are said to grow slightly coarser, especially in the wool.

**The Shropshire** This is one of the most general-purpose of the Down breeds, and it has been bred to suit mixed arable farming in Shropshire and the adjoining counties. The Shropshire is bigger than the Ryeland, and has long been a popular choice for fat lambs, or for lambs for "teggings". A substantial rootbreak is still reckoned one of the pillars of good husbandry on the English-Welsh Border, especially on light soils. The Shropshire and other Down crosses, from Clun and Kerry ewes, make good weights after cleaning up the sugar beet tops and finishing on the roots.

Although the Shropshire has been bred on "Down" lines, it has retained many hardy qualities of the original stocks. The ewes, for instance, may run almost entirely on grassland and consistently rear a lamb crop of 150 per cent or more. Their high fertility in comparison with other Down breeds may be due also to a more steady rainfall, and the fact that the ewes receive plenty of free range on a more productive type of pasture.

Though triplets are an embarrassment, twins are favoured, since the Shropshire ewes are good nurses. A fair proportion of the rams are brought out as shearlings, which obviates the forcing of twins to enable them to catch up with the singles.

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The Shropshires have been prominent in the export trade, since they have proved adaptable to a variety of climates. In North America breeders have their own flock book, and their sheep outnumber those in Britain. Other countries now appear to have succeeded in evolving types to suit their own conditions, though home breeders hope that relaxations of the currency and other restrictions will stimulate the demand from overseas.

**The Clun Forest and Kerry Hill** The Cluns and Kerrys belong mainly to the rearing districts of the West. The former derives its name from an area in the semi-uplands of south-west Shropshire, and the latter from its native hills in Montgomeryshire. The relative proportions of registered flocks occurring in different counties give an idea of the distribution of the two breeds.

COUNTY	CLUNS	KERRYS
	Percentage of Registered Flocks	Percentage of Registered Flocks
Shropshire	37	16
Herefordshire	29	13
Radnor	6	9
Montgomery	4	31
Worcestershire	4	1
Other counties	20	30

The Ryelands and Shropshires are naturally restricted to the lowlands, where they run more or less as a sideline to cattle-fattening or fairly intensive arable farming. In the uplands, where the soils are "thinner" and winter keep less plentiful, the concentration is on sheep-breeding, often with cattle-rearing or "suckling" as a subsidiary. The following Table gives a broad indication of the type of farming.

**Stock per 100 acres of Total Area (June, 1944)**

COUNTY	TOTAL SHEEP	TOTAL CATTLE
Shropshire	40	30
Herefordshire	65	23
Radnor	119	12
Montgomery	112	18

This, however, is only a part of the story. The ultimate trend, whether of sheep or cattle or men, is by intermittent stages from the hills to the valleys. A large surplus of breeding ewes and store lambs from many different types of land is the end product of cleverly integrated systems of stock management.

The Clun Forest is the youngest of the Border breeds of sheep and has evolved from a cross of Shropshire rams on hill ewes of the old Radnor type. The original crosses were required for fattening, and it is probable that the desirable breeding qualities of the females were first discovered accidentally. The offspring of Down rams on hill ewes, though first-rate feeders, often prove to be disappointing breeders. The Cluns are rather exceptional in retaining many of the useful qualities of the hill parent stock.

In regard to the management of early Clun flocks, it is noteworthy that for a long period the fattest lambs, which were mostly singles, were sold during the summer, and the leaner ones kept on as stores—the ewe lambs for breeding. In this way it is probable that a greater proportion of the twin ewe lambs would be retained for stock, and this may have favoured the development of the prolificacy which is claimed to be one of the most valuable characters of the breed.

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The Kerry Hills have sprung from a more typical hill environment. In some districts the Kerry may compete with the Welsh, or they may be crossed with the Welsh to give a hardy local type of ewe known as the "Peckle Kerry". The best Kerrys, like the Cluns, are bred on the lower slopes, especially on the land overlying limestone north and north-east of Craven Arms.

There are considerable differences in the size and "bone" of Kerry and Clun sheep, according to the land where they are bred. These are interesting adaptations to environment, which are also helpful to intending purchasers of draft ewes, who thus have scope for choosing sheep suitable for their "ground". More remarkable, perhaps, is the way the sheep change type after a few generations of breeding on rich lowland pastures. This serves to emphasize the complementary role of heredity and environment, which is by no means peculiar to sheep-breeding on the English-Welsh Border.

**Breeding :** The Ryeland is often referred to as the "white faced" Southdown, indicating the similarity of ideals. A fairly small, well-proportioned animal, is regarded as typical of the breed, and breeders have refrained from selecting for excessive size. In addition to a "good sheep", breeders insist on the white face and legs and a medium short ear of characteristic shape and texture. Although in the nature of fancy points, it is interesting to note they form a practical guarantee of pure breeding, since they preclude out-crossing with other breeds. In some districts a white face is not favoured in rams to be used for crossing. In the Ryeland, however, as in the Dorset Horn, it is related to complete freedom from coloured fibres in the wool.

The Flock Book, which is closed, was started in 1903. The sheep are registered individually, and great importance is attached to strain in matching up the ewes and rams. Lambing takes place in January and February, when the ewes may be brought to shelter and receive some extra feeding. The ewes and lambs return to the pastures a few days after lambing. The ewes are docile and excellent milkers, and lamb crops of 125 to 130 per cent are usual. The clip averages about  $6\frac{1}{2}$  - 7 lb. of washed wool. Ryeland lambs grade 40-50 lb. dead weight in the summer and about 70 lb. as tegs.

**The Shropshire** Despite common aims—the most economical combination of mutton and wool—two types of Shropshires have developed. One is the thick-set sheep of medium size, with a close cover of wool, and the other a less compactly built sheep with a slightly slacker fleece and less cover. The former type was developed at the beginning of the century to meet a keen export trade, which favoured the shorter leg and woolly head. The latter type has always been favoured in the home market, in which general hardiness in commercial sheep tends to be associated with the extra size and a cleaner face and legs.

It seems difficult to select for a heavier fleece without at the same time increasing cover on the body extremities. The ideal appears to be to compromise and avoid the wool meeting too much below the eyes, since wool there interferes with sight, especially in snowy or wet weather.

The relationship of "cover" to hardiness and milking qualities in the ewes is even more obscure, since shepherds report that there are good and bad nurses among both the woolly and the bare-headed ewes. In this connection there is the complicating factor of size. Since the small, compact sheep tend to be fatter than the larger ones, they are unlikely to have the same disposition for nursing their lambs.

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With these reservations, the type is well fixed, and, as in the Ryeland, the breed stamp is indicated by different head points. The head and legs are of a dark, sooty black colour. The head is of medium length and the ears fairly short and fine in texture.

The Shropshire Flock Book was started in 1882, and the Society's sales are held at Shrewsbury. As in the case of the Ryelands, the majority of rams are disposed of as shearlings. It is interesting to speculate whether the preference for shearlings rather than ram lambs has influenced selection for the natural thriftiness and longevity in the ewes, which characterize these breeds.

Shropshire flocks are now run mainly on grassland, and are profitable "scavengers" on mixed arable farms. Their fleeces average 8-9 lb. of washed wool, and those of yearling rams about 15 lb. Lambing is in January and February. Owing to the large number of twins, the Shropshire lambs do not reach consistent weights during the summer. When they are a year old, however, and fed off roots, they weigh about 80 lb. dead weight or more.

**The Clun** Owing to their relationship, the Cluns are often regarded as a hardy type of Shropshire. Apart from the "topping," their faces and legs are clean of wool, and are of the characteristic dark brown colour. The main differences are that the Cluns, though smaller, are a little higher in the leg and of a more "rangy" conformation, being lighter in the shoulders and a little narrower and longer in the head. All these points contribute to their hardy breeding qualities.

In moderately good situations, the lambs quickly mature. The wether lambs are usually sold as stores, and the ewe lambs (about half of which are expected to breed) are kept for stock. Afterwards the yearling ewes rear lamb crops of 150 per cent or more. On this basis it is possible to maintain self-replenishing flocks, while disposing of the regular draft ewes at the unusually early age of 2½ years. Naturally it leaves little scope for culling, which depends on the lamb crops, and the relative proportions of ewe and ram lambs.

Thus, many flocks comprise only two age groups, i.e., the ewe lambs and yearling ewes. There are no specialist ram-breeding flocks, though it is often customary to retain a few older ewes for this purpose. It is noteworthy that there is an almost complete change of ewes in alternate years, which sometimes leads to slight temporary variations in the type. Such changes, however, may be offset by the breeders' skill in selecting rams conforming to their ideal type, as well as by the effects of the local climate and "ground".

It is satisfactory to note that such a large number of flocks are registered. The Clun Forest Flock Book started in 1928. It is an "open" book, though regulations for registration on inspection are fairly strict. The chief sales are held at Craven Arms, Clun, Kingston, and other centres.

**The Kerry Hill** Many of the above points apply to the Kerry, making allowances for conditions. Descending from a hill type of stock, the Kerrys are harder and more suited to poor land. One advantage is that the young lambs have a thicker birth coat, which is a help in bad lambing weather. The clean face and legs and distinctive black and white pattern of the Kerrys are well known. Breeders have devoted attention to these points, since they enhance the alert, gay appearance of the sheep, and are regarded as signs of constitutional hardiness and good foraging ability. They aim to breed for a cleaner face with clearly defined margins to the black and white pattern. Preferably, the black should be confined to an area round the mouth, and a splash on each side of the face near the eyes.

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Like the question of "cover," these fancy points appear trivial, yet they are an important indication of purity of type. They add greatly to the uniformity of draft ewes, which appeal to the buyers, who prefer to breed a uniformly marked type of cross lambs. There is, incidentally, the additional question of appeal to the judges, since the prizes for the best pens of draft ewes of Kerrys (and Cluns) rank among the most coveted awards of stockmanship.

As the Kerrys are often kept in poorer situations than the Cluns, the lamb crops vary and may drop to, say, 120 per cent, instead of the usual 150 per cent, for two-year-old ewes. In poor situations the ewe lambs are generally too small for breeding in their first year and the drafting of ewes is therefore deferred for one or two years.

The Kerry Hill Flock Book, which is "open", was started in 1899. The chief sales are held at Kerry, Craven Arms, Knighton, and Kington.

**Flock Management** Clun and Kerry ewes in the Border country run chiefly on grass. Supplementary feeding is moderate and usually does not begin until the onset of bad weather. The ewe lambs, if in lamb, will require extra feed, such as a run on to some kale or sugar beet tops, or even a few oats. As lambing is in March and April, the general management is such that heavy lamb crops are raised on little more than good pasture.

Lambs are generally weaned fairly early, especially from the ewes to be sold as regular drafts, in order to allow time for them to freshen. The store lambs sometimes suffer by this and may make slower progress than, for example, cross lambs which have been weaned much later. As feeding sheep, the Cluns are reported to finish a little earlier than the Kerrys, though when properly fed on roots, "tegs" of the two breeds will grade 60 lb. dead weight and over.

The fact that the Clun and Kerry Flock Books are open leads one to consider the relationship of breed type with systems of flock registration and breeding policy. Flocks are registered on inspection, and may be accepted or rejected as a whole. Many breeders believe the open book is essential for occasionally introducing fresh blood, thereby safeguarding constitutional hardiness. Though unscrupulous persons may take unfair advantage of the opportunity, it seems to work out satisfactorily in practice. For instance, it permits a breeder with a light fall of ewe lambs to supplement them from a suitable commercial source, if possible from higher or poorer ground.

The chief disadvantage is that, following such introductions, their offspring may include good looking rams which may turn out disappointing breeders. This problem, however, may be misjudged unless viewed against the general background of breeding in the Border area. There is a keen following of both commercial and pedigree breeders, practically unhampered by conflicting ideals. The gradual movement of stock from the hills to the valleys is regarded as an important element in preserving the hardiness of the sheep, as well as in the capital appreciation in their value.

## AGRICULTURAL EDUCATION IN SHROPSHIRE

H. MARTIN WILSON

*Secretary, Shropshire Education Committee*

**I**N a county like Shropshire, agricultural education is a paramount service in its significance and potential fruit. The Shropshire Education Committee is deeply aware of its responsibilities—aware that knowledge of scientific developments, technical skill and training are quite as important as in any other industry, and that a well-educated rural community and a sympathetic urban population are of equal value.

The Committee's object is to build a structure of advisory and instructional work according to the needs of all in the industry—the young worker, the older man, the specialist, the man who is at an advanced stage and wants to study, for practical application, the latest results of scientific research and agricultural practice. The field of technical training to be covered is unusually diverse, and a variety of experiments are going on in Shropshire to lay good foundations for a comprehensive scheme.

**The Place of the Farm Institute** The focal point of technical agricultural education is the Farm Institute, and after much searching, since the Education Committee took over responsibility for agricultural education in 1945, a suitable farm and premises have at last been found at Walford Manor, some seven miles to the north of Shrewsbury. The Institute, which it is hoped to open in the autumn, will do work of the utmost value, not only for its regular fifty students a year, but for those who can come for short courses—farmers, young and old, and teachers—and in the advice its staff can offer and the part they themselves will play in classes and courses throughout the county and in helping the domestic grower and producer. The work inside the Farm Institute is only one part of the technical advice and training needed by the agricultural community. Outside it agricultural education must serve the young recruit, the workers who will never go into a Farm Institute, the many who have missed their opportunity, and the large number of groups and individuals with a special interest, the allotment-holders, keepers of pigs, poultry, bees, and other small livestock; and the rural housewives, too, form a very important section of the community with their interest in the produce of the garden and its use, the preservation of fruit and vegetables, bacon curing, and the whole round of household economy.

**Part-time Courses** After the war the Committee found itself with no general agricultural staff. Nevertheless it was determined to make a full and realistic contribution to the needs of agriculture, and in this effort the farmers gave whole-hearted support. On technical agricultural subjects a good start has been made. In the first two years after the war, classes in tractor maintenance were established in over a dozen centres in the county. Last year, however, a broader front was opened up at a conference of representatives of the National Farmers' Union and the National Union of Agricultural Workers, and others interested. There was general agreement on the need for technical instruction, and the industry was willing to help. A series of small advisory working parties was set up on crop husbandry, animal husbandry, farm machinery, farm management, manual skills, the needs of the young worker, the needs of the smallholder and the hill farmer, to advise on the kinds of courses and subject-matter that would be suitable within their own particular field and to make proposals for lecturers and demonstrators. On the work of these meetings a substantial and varied programme of part-time courses was arranged last winter. These



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courses have ranged from a group of three general or very practical lectures, perhaps arranged for the broad body of members of the individual Young Farmers' Club, to the longer series of nine in a market town centre or a wider area, for those who are prepared to specialize in a particular aspect of farming. The Committee works very closely with the keen and successful Young Farmers' Club movement, which it wants to see extended to cover the whole county. The next stage is to develop day-time classes at which the youngster can get a more solid course of instruction; these will to some extent be the forerunner of the County College—the Day Continuation course which will later be compulsory for all. It has been noted before that in Shropshire some forms of special education can be offered only through residential courses, and these have had a particular appeal to the more knowledgeable young members of the farming industry. Mid-week, weekend and full week residential courses which have been specially arranged at Harper Adams College, the Shrewsbury Technical College and the new Residential Adult College at Attingham Park, have been strikingly successful and will undoubtedly be a permanent feature of future arrangements.

During the last winter over a thousand people, with a variety of needs, have attended the Committee's forty courses; and allowing for all the vagaries of an experiment, it seems that they have made a useful contribution to the knowledge on which a comprehensive scheme will be built. For the success of these developments full tribute must be paid to the work and enthusiasm of the leading Shropshire farmers. The County branch of the N.F.U. has shown initiative, co-operating with the Committee, making proposals, and coming forward with the practical help of many individual farmers whenever the Committee asked for aid in formulating or executing its programme. The N.U.A.W., too, has been a keen supporter of educational activity. It augurs well for the future that the Education Service and the agriculturists are working together in closest co-operation and agreement to study and serve the interests of the countryside.

**The Schools** Technical education, however, is only one part of the Committee's responsibilities to agriculture. Those who come forward for agricultural education must themselves have a good educational foundation. We are long past the days when it was thought that any dullard would do for farming and that no special knowledge or ability or cultivation of faculties was necessary. It is a commonplace, too, that the rural Primary and Secondary Schools are at their most successful when they weave into their life and work the lore and skill and characteristic activities and interests of the countryside. Rural schools must have, according to their needs, equal opportunities with those of the towns and cities. They must be housed in good buildings, be well equipped and well staffed. Indeed the core of the problem is the recruitment of staff with a genuine feeling for country life and, in certain posts, with a knowledge of some of its distinctive pursuits. The Committee has long looked forward to the establishment of a number of modern schools in the rather larger villages and market towns as the keystone of good rural education—and also perhaps as the home of more general social and educational activity for the rest of the community, on the style of the Village College.

In some Secondary Schools pre-agricultural courses will extend the kind of work that has been carried out for the last four years in the Junior Agricultural Course at the Shrewsbury Technical College. The interest of the schools (including the town schools) is lively. There is distinguished work in gardening and rural activities. Farm visits are a regular feature of the school year; farmers co-operate splendidly; teacher and farmer work together to

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get the greatest benefit from the farm visit and to make plain the underlying principles of farming practice ; and at the annual West Midland Show leading farmers now conduct parties of children round the exhibits.

The Committee is continuing to develop its rural advice services to schools and refresher courses for teachers on agricultural subjects and the general educational problems of the country school.

The flow of country boys and girls into urban occupations is no longer a one-way stream ; town boys are becoming increasingly interested in agriculture as a career. The town school can evoke a live interest in the countryside by fostering an understanding of the foundations of our economic health and survival, for the activities of the countryside are of the essence of man's primary needs.

**Country Life** The education service also has a part to play in meeting the wider demands of the country dweller. Hobby classes are offered, and the number of Evening Institutes increases. The Committee's staff is always ready to help on the good work of the Women's Institutes, and young people are encouraged to healthy activity through youth clubs established in most villages. The County Library has begun to serve the country reader almost on his doorstep with a Travelling Library. Drama and music are encouraged in the villages, and by festivals. Birmingham University and the Workers' Educational Association carry their programmes of adult education into the country areas, and the Walker Trustees (executing the will of a Shropshire ironmaster), the Carnegie Trustees, the University and the Education Committee have co-operated to establish a residential college in a fine Shropshire mansion, Attingham Park, three miles from Shrewsbury, open to all classes and all interests, for day, weekend and week courses and conferences, and designed to be a focus of the cultural life of the county. Attingham will, it is hoped, be the centre of the network of adult education throughout Shropshire ; other experiments are going on in the establishment of area tutors, each responsible for a section of the county.

All concerned with this work, both technical and general, have a keen appreciation of its ultimate importance to the nation, for upon it and similar work in other counties rests the physical and spiritual well-being of our people.

## BILLHOOKS AND SLASHERS

JAMES WHITE

*Rural Industries Bureau*

THE very names of these edge-tools are reminiscent of a fine and enduring tradition which is rooted deep in the English countryside. Of the infinite variety of billhooks, many take their names from their places of origin, such as the Tenterden billhook, which has a sweeping curve like the beak of an eagle, or the stubbier Kent billhook. The Norfolk hook has a straight spine and gently curving edge, and the Stafford broomhook has an additional short cutting edge on the spine. Then there is the Irish slasher, a magnificent double-edged tool, and Sir Tatton Sykes gives his name to a long straight-edged slasher. There are slashers for hedges, slashers for gorse, and slashers for beans. The smooth combination of their curves gives each one a grace of its own. For generations the craftsman has sought to suit the tool to the hand which uses it and to match it to its purpose.

To those who use these tools all day long and day after day, these qualities of balance and edge are of supreme importance. The weekend

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gardener who merely wants to trim a short hedge is content to slash for twenty minutes with a crude machine-made tool. But the forester and the underwood worker who will use the tool for many hours on end will always try to acquire one hand-made by a skilled smith.

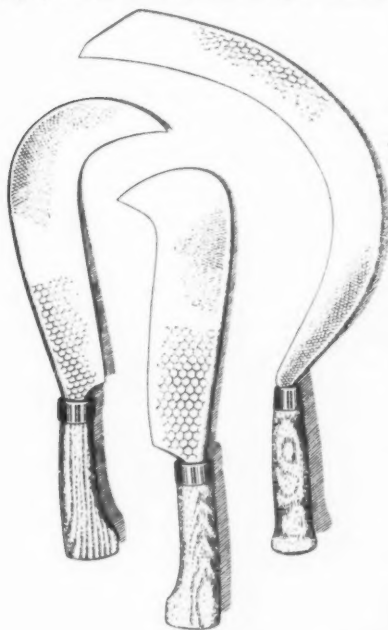
Unfortunately the hand-made tool is hard to find these days. The main reason is that the iron of high quality which was converted into blister steel and used for hooks and slashers came from Sweden. This iron is now difficult to obtain and very expensive. Substitutes have been tried but they are not satisfactory because they do not give the same fine cutting edge.

This Swedish iron bar is commercial iron in its highest state of purity and is worked by a special process. The iron is heated almost to melting point, and controlled quantities of carbon are worked into its surface. The heated steel is then folded like pastry and forged together in order to incorporate the carbon in its structure. According to the number of times this is done, the steel is known as single or double shear. Woodmen, thatchers and farmers still demand tools such as riphooks, billhooks, slashers, thatch knives, etc., made from this steel. They claim that tools forged from double-shear blister steel retain their cutting edges far longer than the machine-made tools of carbon steel. Tools made from blister steel sharpen with a characteristic wavy edge, which is caused by the alternating hard and soft structure of the steel, and in that form they wear better. Possibly the wavy edge gives a slight sawing quality to the cut and makes it more efficient. Whatever may be the explanation of this irregular cutting quality, the craftsmen who use the tools are emphatic in their preference for this material, which is worked into an implement of perfect balance and requisite shape by a skilled smith.

One of the ways in which smiths obtained suitable steel was to use old rasps, which were heated to give them strength and tempered to keep the sharpness of the edge. Tools made in this way (as those shown here) usually retain the pattern of the original rasp, which survives faintly on the surface like fish scales. But since the supply of old rasps is limited a great quantity of tools cannot be produced in this way.

A fine edge of sufficient strength can also be obtained by using layered steel. The centre filling is hard and gives a good edge, but it is brittle; a milder steel is therefore used on either side in order to strengthen the blade. These two types of steel combine to give the characteristics of a keen edge and a strong blade. The blade is then drawn out under the hammer, tempered, and ground.

Because foresters and woodmen still seek these hand-made edge tools the Royal Agricultural Society is this year holding a competition at the Royal Show for the best billhooks and slashers



## BILLHOOKS AND SLASHERS

made by a smith. The tool must be hand-made, but the smith will be allowed to use the power hammer, which requires quite as much skill as the hand hammer. The judges will be Mr. P. E. Barnes, Head Forester of the Penrhyn Estate, N. Wales, and Mr. A. W. Williams, Chief Technical Officer of the Rural Industries Bureau. It is hoped that the competition will stimulate rural smiths to make these high quality tools and so meet the need of foresters. The hand-made tool is slightly more expensive than its machine-made cousin but its advantages to the forester in quality justify every effort being made to maintain the smiths' skill in this particular direction. The display of these magnificent tools should arouse considerable interest among all those who use them, if for no other reason than the divergence of preferences and opinions which exists about their design.

A billhook that is considered the best possible shape in the West of England may be rejected with "contempt" as an altogether useless tool in the eastern counties. However, the judges have sufficient technical knowledge to award the laurels where they are most deserved.

## BOOK REVIEWS

**Cherries.** NORMAN H. GRUBB. Crosby Lockwood. 30s.

No book on fruit-growing published of recent years has contained more information in such compact form; as a work of reference it sets a new standard in fruit-growing literature. The author has had a unique opportunity of combining a detailed experience of commercial cherry-growing, not only in Kent but elsewhere, with research into problems of cherry culture at the East Malling Research Station, and his book, backed by the experience of a lifetime, has obviously been compiled with the same sincerity and meticulous care that have characterized his researches into a wide field of fruit-growing problems.

Cherries have been grown commercially in England for many generations, and a fund of knowledge exists in orchard practice. The fastidiousness of this fruit as to soil and climate is well known, but it is only lately that such problems as pollination and of rootstock have been sufficiently understood to improve beyond measure the prospect of success in cherry orcharding.

Part I deals concisely, yet adequately, with those considerations of site, soil and climate which have had a marked influence on the distribution of the cherry-growing areas of England, and Chapter IV (Propagation and Rootstocks) condenses all available information on a subject fundamental to success in tree production and growth. Apparently the chances of a dwarfing cherry rootstock comparable to M.IX are at present remote, but Mr. Grubb is hopeful that one will come to light in the future through investigations now proceeding on the problem. Sound and clear advice is given on orchard planning and management, pollination and the choice of varieties.

Part II, occupying by far the greater part of the book, will unquestionably prove of enormous value to grower, research worker and student, as the standard work on the identification and description of cherry varieties. With few exceptions, the descriptions of varieties are written from actual knowledge and sight of the sorts named.

A confused nomenclature has been a serious obstacle to success in the industry in the past; the author's information on species and groups of cherries, description and identification of varieties, together with the twenty-eight photographic plates (some in colour), will be of inestimable value.

E.W.H.

## BOOK REVIEWS

**The West of England.** RUTH MANNING-SANDERS. Batsford. 12s. 6d.

As a guide to the delights of Cornwall, Devon, Somerset and the Isles of Scilly, this latest volume in Batsford's *Face of Britain* series would be difficult to surpass. The author writes attractively and with an intimate knowledge of her ground, and the publishers have ably supported her by a good presentation. There are over a hundred photographic illustrations. The book will be of interest equally to those who know this part of England and to those who do not; for the one, besides renewing old acquaintances, may well find mention of some little corner, a sequestered hamlet, some church, or scrap of history that has so far escaped him; the other, because a world of interest and charm is opened up in such graceful, even seductive, language.

The author contrasts, for example, the grim austere Bodmin moor in Cornwall "... where there is nothing but thin grass, heather, granite-rough hills, little ponies, small, black, hornless cattle, bogs, pools, a few china-clay dumps, and the moaning of the fiend-pursued spirit of Tregeagle", with Dartmoor, lying across the border, which comes out of its mists to reveal an infinite variety of shape and colour, and a genial, invigorating atmosphere. Here is "a world of superb landscapes and glowing colour, swift golden rivers, shining valleys and great hills that are pointed and individualized by their towers of granite; a world, too, of vast bogs, and acres of peat, slashed and furrowed like any battlefield by heavy rains. Here storm-clouds topple among the hills and rain falls swiftly, to be rent as swiftly by glittering sunshine... Down below the sunlight sparkles on every rain-beaded twig and bracken frond, and in the drenched thickets whitethroats are merrily singing. There are, perhaps, no grander skylines to be seen anywhere in England".

This book is alive with such verbal beauty and adds considerably to the inherent interest of this corner of England, which the author describes so well.

S.R.O'H.

**Shropshire.** EDMUND VALE. Robert Hale. 15s.

**Worcestershire.** L. T. C. ROLT. Robert Hale. 15s.

In the same genre are these two *County* books from the Robert Hale press, and if we may judge the series from the sample, it will be well and widely received. We seldom outgrow the feeling of loyalty for our native county and, if the truth be admitted, it often leads us into extravagant claims on the one hand and deprecation of another's merits on the other. The latter, more often than not, may be the result of imperfect knowledge, and to this these *County Books* will be a useful corrective.

No "proud Salopian" will have cause, I think, to accuse Mr. Vale of doing less than justice to the claims of Shropshire, despite the author's cautionary foreword. Within its 1,346 sq. miles there is a wealth of varied beauty, natural and man-made, that yet bears the impress of history and tradition. Admitted that some part of the spirit which pervaded the Shropshire countryside before the war has been dissipated by the austerity of our time, but "though much is taken, much abides"; the elements of rural life are still conserved, as in Corvedale, for example, where the Celtic-sprinkled dialect is still alive and the rising generation is bilingual.

Of Shrewsbury itself, one of the noblest of old English cities, Mr. Vale claims it as "a peculiar instance of a town which history has served well at almost every turn". Conscious of its heritage, it brings its past glories forward to serve the practical needs of the present. The quaintness of the ancient "struts" and "gullets" which run between the houses never fails to delight the newcomer to Shrewsbury, but if at one end the visitor finds himself in the romantic, half-timbered world of Elizabethan and Jacobean buildings, at the other he will find essentially practical, smart, modern shops.

Across the border, Worcestershire, less than a quarter the size of Shropshire, has a character all its own—the character which evoked the nostalgia of F. W. Harvey from Flanders in the first World War:

*I'm homesick for my hills again,  
My hills again!  
Cotswold or Malvern, sun or rain!  
My hills again!*

He remembered the red soil, patterned by fruit plantations, the rising dark slope of Wyre, the foothills of the Shropshire Clees, Titterstone and Abdon Burf, and the Severn, nourished by the Avon, sliding majestically from north to south through lush meadows to the sea. Mr. Rolt's approach to his subject is primarily historical and sociological, taking in the topography as he goes. This is unusual in a book of this nature, but the result fully justifies the method. It presents the natural beauty of the countryside—and, no less, the ugliness of some of the industrial towns in the north—in terms of what man has made of his heritage. And that, after all, is the stuff of history and the measure by which we ourselves will be judged by the generations that come after.

S.R.O'H.

## BOOK REVIEWS

**Fream's Elements of Agriculture.** (13th Edition). Revised and Edited by D. H. ROBINSON (1949). John Murray. 21s.

A farm book-shelf without a copy of Fream's is akin to a farm without a plough, and when Dr. William Fream first published his textbook in 1892 it is unlikely that he anticipated the success that would attend his efforts.

There can be very few students who have passed through the universities, colleges and institutes of this country without meeting this veritable encyclopaedia of the science and practice of British agriculture. Since the first edition, the work has been revised many times and the 12th edition was entrusted to the staff of the Cambridge School of Agriculture, in 1932, under the editorship of Sir Rowland Biffen. Since 1932 great progress has been made in every aspect of British farming, and the Royal Agricultural Society of England quite rightly determined at the end of the second world war that a completely new edition was necessary. The editorial work was entrusted to Dr. D. H. Robinson, who, assisted by a team of specialists in the different branches of agriculture, has entirely rewritten the work, which is now illustrated with over a 100 text drawings and 116 excellent photographs.

A new chapter on buildings and permanent equipment has been added, special attention has been given to the use of mechanical power in farming, and a great deal of useful information has been summarized in a series of five appendixes. There is also an adequate index. The illustrations merit special note, especially those covering some of the insect pests.

The text is extremely readable and authoritative, and can be thoroughly recommended to all students at agricultural colleges, institutes and schools who need a reliable textbook covering the whole subject. Farmers who wish to gain an all-round general knowledge of agricultural science will find that this new edition meets their needs admirably. Indeed it is one of the best investments that anyone interested in the land can make.

H.I.M.

**Journal of the British Grassland Society**, Vol. 4, No. 1 (March, 1948).

Two papers in the latest issue of the British Grassland Society's Journal deal with field experimentation as applied to grassland. Dr. D. A. Boyd in a paper entitled "Experiments with Leys and Permanent Grass" discusses factors affecting the technique and design of grassland experiments and illustrates his points with a description of a new experiment being laid down at Rothamsted. A paper by J. O. Green discusses herbage sampling errors and the possibility of reducing such errors in grazing trials. Two further papers deal with pasture evaluation. T. E. Williams discusses possible methods of quantitative grassland evaluation. Little work has so far been done in this direction and the possibilities of various methods are examined. He deals at greater length with qualitative evaluation by botanical classification; the method which has been largely used in assessing the productivity of grasslands in this country. A. Jantti, a Finnish Research Worker, describes a statistical estimation of the output of different types of pasture in Finland, based on a country-wide statistical investigation. Dr. R. O. Whyte contributes an interesting account of the problems of fodder production under conditions of primitive agriculture in a Mediterranean environment with special reference to Cyprus, and discusses the difficulties involved in providing a balanced form of agriculture under these conditions.

An investigation into the establishment of autumn-sown legumes is described by Betty F. Martin, and the results confirm the difficulty of their establishment. The question of suitable species for use in the reseeded of land which is frequently subjected to prolonged flooding is a matter requiring further investigation. The last-named author, with A. G. Davies, describes a pilot experiment to test the effect of artificial flooding on certain grass species.

W.E.J.

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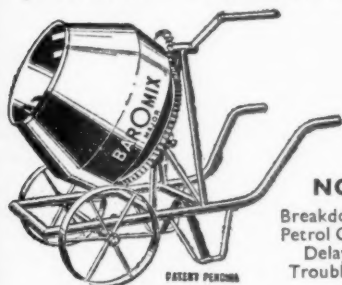
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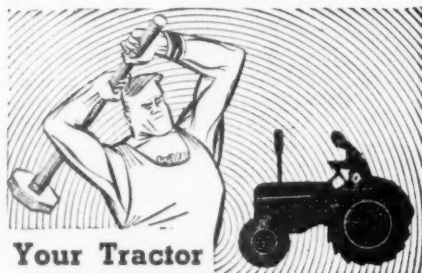
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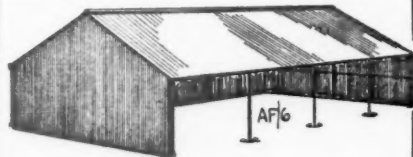
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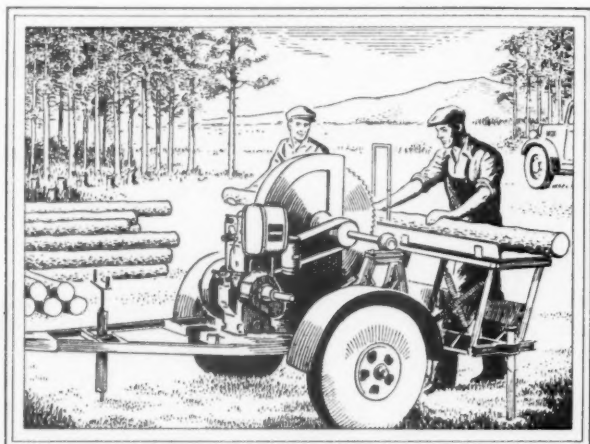
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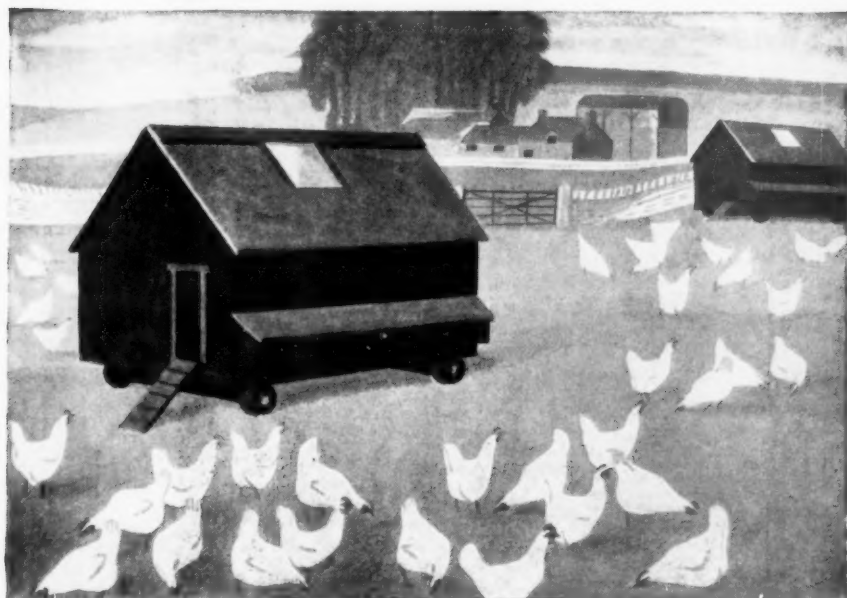
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